5-2021

Recruiting Minoritized Mathematics Preservice Teachers with Retention in Mind

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To the Graduate Council:

I am submitting herewith a dissertation written by Nicholas Scott Kim entitled "Recruiting Minoritized Mathematics Preservice Teachers with Retention in Mind." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Teacher Education.

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Recruiting Minoritized Mathematics Preservice Teachers with Retention in Mind

A Dissertation Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Nicholas Scott Kim

May 2021

DEDICATION

This dissertation is dedicated to my family:

my wife, my mother and father, and my brother.

I could not have achieved this without your financial, mental, and emotional support.

Without their support financially, mentally, and emotionally,

this all could not have happened.

I strive to promote equity in schools and society

on behalf of you all.

ACKNOWLEDGEMENTS

To my doctoral committee: I would like to thank Dr. Lynn Hodge. This dissertation would not be possible without you. Thank you for being a true mentor by helping me become a better version of myself and providing opportunities I never dreamt would happen on my own. You believed in my personal and professional growth without trying to modify who I am. You are truly the type of role model I want to become when working with college students. I would like to thank Dr. Francis Harper who challenged and guided me through my professional writing and research endeavors while being incredibly supportive and inclusive. I would like to thank Dr. Tara Moore who has always provided constructive feedback and stretched my thinking to consider all student populations. I would like to thank Dr. James Martinez for checking in on my health and progress during a difficult time in my life. Thank you all for contributing to my growing confidence in my abilities as a researcher and writer.

To my family: I would like to thank my wife, mother, father, and brother, who are my biggest supporters of my academic success. Thank you for being a consistent source of love and motivation throughout this journey. Without you all, I could not have accomplished this great feat.

ABSTRACT

The primary purpose of this research is to provide insight into the narratives and experiences of minoritized preservice teachers (PST) interested in teaching mathematics and how those experiences impact recruitment and retention of those minoritized teachers. “Minoritized,” as used here, is defined as one who identifies as a person from a historically underserved community based on race or ethnicity. As a result, this study is positioned to provide researchers, educators, and administrators with much needed direction into how to diversify the teaching force beyond the dominant storyline of the White majority, and why it is important to do so.

Narrative inquiry framed through an equity lens was chosen as the methodology for gathering and analyzing data from one-on-one, structured interviews as well as a focus group interview. The findings from the data analysis resulted in these overall resonant threads: (1) Minoritized Identity, (2) Critical Individuals: Supporters and Resistors, (3) “Aha Moments”, (4) Teacher Educator Programs (TEP): Learning and Barriers, and lastly (5) Retention factors for Minoritized PSTs. In summary, the PSTs’ minoritized identities clearly impacted their decisions to pursue and remain in mathematics teacher education. All participants could recall aha moments when dealing with important people in their lives who either supported or attempted to resist their journeys to pursue teacher education.

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Chapter 1

INTRODUCTION

The primary purpose of this research is to gain insight into how to recruit and retain minoritized mathematics teachers using the narratives and experiences of minoritized preservice teachers (PSTs).[1] Specifically, this research aims to identify common incentives and deterrents that factor into minoritized PSTs' decisions to become, or not become, a mathematics teacher. By identifying such commonalities and differences, this study is positioned to provide researchers, educators, and administrators with much needed direction as to how the teaching force can be diversified, and why it is important to do so.

Generally speaking, teacher shortages across the United States in elementary, intermediate, and secondary schools are a well-known concern[2] and can be attributed to the difficulties in recruiting and retaining highly qualified teachers. The American Association for Employment in Education (AAEE, 2016) found data indicating a considerable teacher shortage in the Southeast United States. More specifically in Tennessee, projections indicate that half of the more than 65,000 teachers in the state will leave or retire within the next decade (Aldrich, 2017). Teacher preparation programs, policymakers, and administrators are especially familiar with said difficulties in that they are continuously tasked with the challenge of finding highly qualified teachers in response to a decrease in enrollment for teacher education programs (TEP) (Flannery, 2016; Westervelt, 2015), a high rate of teachers leaving the profession only after a few years, and a high proportion of veteran teachers retiring.

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[1] For the purposes of this research, the term "minoritized" is defined by McCarty (2002) to mean one who deals with the power relations and processes by which certain groups are socially, economically, and politically marginalized within the larger society. This research will focus on race and ethnicity of historically marginalized preservice teachers of color.

[2] Using data from the National Center of Educational Statistics (NCES), ACT (2014) projected a 14% increase in the expected teacher positions needed in the United States from 2010 to 2021.

When discussing teacher shortages, it is crucial to address not only issues relating to recruitment, but also as they relate to retention. In addition to a decline in teacher enrollment[3] and the large population of teachers retiring,[4] the number of teachers leaving the profession early in their careers has contributed to teacher shortages. A significant percentage of teachers leave their profession before the fifth year of teaching,[5] with some reporting more manageable workloads and better work conditions in their subsequent, non-teaching positions.[6]

Shortages of specifically minoritized teachers coupled with the growth of minoritized students attending schools raise additional challenges. According to McFarland et al. (2018) and National Center for Educational Statistics (NCES, 2019), minoritized students made up approximately 52% of public-school students in 2015-2016. By contrast, however, minoritized teachers made up approximately 20% of U.S. public school teachers during the same timeframe – constituting a mere 4% growth since 1999-2000 (McFarland et al., 2018; NCES, 2019). These statistics evidence the unlikelihood of many minoritized students seeing a proportional number of teachers representing their own communities. This is significant in that minoritized teachers are more likely to honor and support the cultures and interests of minoritized students, and according to research, such exemplification has been found to be a source of motivation for some minoritized students (Guarino et al., 2006). Minoritized teacher recruitment is not a new concept, even appearing in discussions when teacher shortages were not in as dire need as today. In the

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[3] Berry and Shields (2017) found enrollment in teacher preparation programs dropped dramatically by 35% nationally between 2009 and 2014.

[4] The advancing age of the baby boomer generation, as it relates to the increase in teacher retirements, has been viewed as another cause of shortages (Newberry & Allsop, 2017; Harris & Adams, 2007).

[5] In 2012, between 19% to 29% of teachers left the profession before their fifth year of teaching, thereby creating more teacher shortages (NCES, 2014). In 2012, as many as 16% of teachers, nationally, either moved to different schools or left the profession. (NCES, 2014).

[6] About 51% of public school teachers who left teaching in 2012-2013 reported that the manageability of their work load was better in their then current, non-teaching positions. (NCES, 2014). Equally important, 53% of teachers who left their public school positions reported that their general work conditions were better in their then current, non-teaching positions (NCES, 2014).

late 1990s, Kirby et al. (1999) "pointed out the recruitment of minority individuals into the teaching profession did not keep pace with enrollment increases in the 1980s and early 1990s" (as cited in Guarino et al., 2006, p. 180).

While there is a shortage of minoritized teachers across all subjects, this research is limited in scope to focus on said shortage within the mathematics context for four reasons. First, the subject of mathematics is highly evaluated via standardized testing among students of all ages. Second, proficiency in mathematics is considered a gateway to future financial success. Consequently, the lack of minoritized mathematics teachers can have implications for how minoritized students engage with the content in the short and long term. Student engagement and achievement in mathematics can contribute to students' educational and life opportunities (Moses & Cobb, 2001) and financial success (Martin et al., 2010), thus reflecting the idea of mathematics as a gatekeeper. Third, mathematics teacher shortages are well-documented nationally and locally. Mathematics teachers as well as science and special education teachers are in demand due to their high turnover rates in rural, urban, and low socioeconomic schools (Guarino et al., 2006). Finally, policymakers, administrators, and researchers have called for immediate action to improve student outcomes and inequities within mathematics education.

Minoritized students' success in mathematics has been a concern for some time, as there is a visible gap in achievement scores when analyzing standardized mathematics test scores. Minoritized students, such as Black and Latinx, have historically scored significantly lower on standardized assessments than their White counterparts – especially in the field of mathematics. In comparing mathematics scores on the 2007 National Assessment of Educational Progress (NAEP), the NCES reported a 31-point gap between Black and White 8th grade students across the nation (2009). Similarly, when comparing mathematics scores on the 2009 NAEP, the NCES

reported a 26-point gap between Latinx and White 8th graders across the nation (2011). More recently, in comparing mathematics scores on the 2016 ACT, Black students, on average, scored 4.7 points less than their White counterparts (The ACT Profile Report-National, 2017). Similarly, on the same assessment, Latinx students, on average, scored 4.1 points less than their White counterparts (The ACT Profile Report-National 2017). On the other hand, average Asian student success in mathematics shows a counternarrative of a lower score achievement gap between minoritized students vs. White students. Asian students, on average, scored 3.3 points higher than their White counterparts on the 2016 ACT (The ACT Profile Report-National, 2017). It is also important to consider that within the Asian student population, and all student groups in general, that there are vast differences in student achievement and that all Asian students should not be grouped as one overachieving demographic.

It is imperative to recognize that testing scores are just one way to measure achievement, and gaps in test scores should not be the sole focus in attempting to address disparities in mathematics education. For example, Gutiérrez (2008) believed mathematics education researchers should focus on "supporting the mathematical identities, excellence, and literacies of marginalized students" (p. 357). She believed there are four dimensions of equity, including access, achievement, identity, and power, and focusing only on gaps ignores the last two dimensions completely. For instance, overlooking one's identity completely disregards the personal, family, and social characteristics that shape an individual. One's identity is not necessarily fixed, but rather constructed through a combination of pre-defined genetics and life experiences. While one can certainly use gaps as a factor in determining disparities among students, those gaps should not be the sole focus when addressing inequities. Rather, mathematics stakeholders should consider different pedagogical approaches that take into

account the perspectives of the minoritized community, including minoritized students and teachers.

Issues and Problem Statement

A substantial body of research has addressed issues of teacher shortages and recruitment in general as well as more specific issues of teacher shortages among disciplines including science, technology, engineering, and mathematics (STEM). Fisher and Royster (2016) found that secondary level core subject teachers such as mathematics and science teachers as well as special education teachers are the most likely to leave the teaching profession. Fisher and Royster (2016) take a look at multiple studies that offer different explanations as to why mathematics teachers leave the profession early including:

- not enough preparation in mathematics content
- stressful situations from poor student behavior and lack of administrative support
- pressure from high-stakes testing.

Fisher and Royster (2016) also offer solutions to reduce teacher stress levels and ease the teacher retention problem by offering suggestions for stronger professional development, more effective mentoring for new teachers, and more productive peer collaboration.

In spite of studies such as these, we still know little about how to recruit and retain mathematics educators in practical ways. There have been suggestions such as increasing salaries, providing more days off, providing more in-class support through teacher assistants, administrative discipline, or smaller classrooms; those suggestions, however, are limited to local school district financial budgets (Guarino et al., 2006). Therefore, we are forced to look for new and innovative ways to recruit more teachers, especially mathematics teachers, in practical ways that do not require extensive budget reforms that are unlikely to be implemented.

This study addressed the broader issues of diversifying the teacher workforce and teacher shortages, particularly in the area of mathematics education. In doing so, the study shined light on effective recruitment and retention strategies by identifying common stories amongst minoritized participants. These common stories provided guidance in what and whom recruiters should target when identifying possible minoritized candidates for teacher education programs (TEP). The study relied on one-on-one PST interviews to provide individual perspectives of PSTs of different races or ethnicities while providing opportunities to pinpoint common themes and differences amongst the different groups. In addition to the one-on-one interviews, there was one focus group session with three participants to spur conversation and discovery about their life experiences while also confirming ideas in their individual interviews. The focus group allowed participants to exchange viewpoints and discuss similarities and differences that a one-on-one interview cannot achieve. This study explored Fisher and Royster's (2016) hierarchy of needs of mathematics teachers based on Maslow's original hierarchy to determine which stages are most important to minoritized PSTs for retainment or, alternatively, whether new stages need to be created based on the narratives and experiences of minoritized PSTs.

Purpose of the Study

The primary purpose of this research is to provide insight into how to recruit and retain minoritized mathematics teachers using the narratives and experiences of minoritized PSTs. The findings will use commonalities and differences among races to develop plans for universities, colleges, and schools to diversify their mathematics PST cohorts and teaching positions. The underlying premise is that minoritized PSTs experience similar, yet different, life experiences that drive their interests to pursue mathematics teaching in secondary education. By understanding the narratives of minoritized PSTs and finding similarities and differences among

races or ethnicities, researchers and practitioners can develop more succinct plans to diversify their teaching cohorts and faculty. Moreover, by implementing a narrative inquiry approach based on the works of Clandinin and Connelly (2000) and Clandinin and Huber (2010), I am in the midst of the narrative, co-experiencing and co-authoring the story of inquiry and prompting the stories of the participants as I work together with them throughout the study. To clarify, I identify myself as a minoritized teacher of color who pursued teaching mathematics after returning back to college to pursue teacher education. I believe my experiences will be similar, yet different, to some of my participants in the study. I intend to gain an understanding into how their personal narratives cultivated an interest in teaching secondary mathematics and whether there are commonalities or differences among the different races.

Research Questions

The following research questions will be used to address the purpose of my study:

Primary Questions with Secondary Questions

1. How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?
    a. Does an identity as a minoritized individual based on race and ethnicity affect one's pursuit of mathematics education?
    b. How has the teacher educator program aided or hindered one's pursuit to become a mathematics educator?
    c. What are the similarities and differences in experiences between different races and ethnicities that are pursuing mathematics teacher education?
2. What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs (TEP)?

a. What are barriers for minoritized preservice mathematics teachers to remain in teacher educator programs (TEP)?
b. What do you believe are the most important factors for minoritized mathematics teachers to continue teaching mathematics for a long career (over 10 years)?

Significance of the Study

This study has significance for both theory and practice. With respect to theory, this study informs narrative inquiry research in two ways. First, this study contributes to our understanding of how stories and experiences can provide a holistic perspective of minoritized PSTs when they pursue mathematics teaching. Second, this study examines the relationship among different races and ethnicities, and how each story either has similarities or differences to pursue teaching. This is important if we are to successfully leverage the possible benefits of recruiting more highly qualified minoritized mathematics teachers.

With respect to practice, this study can offer practical and actionable suggestions to TEPs, administrators, and other stakeholders on how to recruit and retain minoritized mathematics teachers. With the increasing demand of science, technology, engineering, and mathematics (STEM) teachers, coupled with the rising numbers of minoritized students, stakeholders looking to diversify their teaching cohorts and faculty can use this research to practically recruit and retain minoritized mathematics teachers. In addition, this study aims to show that minoritized PSTs may require different curriculum or opportunities when understanding their roles as minoritized mathematics teachers.

Definition of Terms

I am using the following terms to facilitate the underlying issues within teacher recruitment and retention and how equity calls for more diversity in teacher education, specifically mathematics education.

minoritized: defined by McCarty (2002) to mean one who deals with the power relations and processes by which certain groups are socially, economically, and politically marginalized within the larger society. This research will focus on race and ethnicity of historically marginalized preservice teachers of color.

diversity: differences based on race or ethnicity.

privilege: a special right, advantage, or immunity granted or available only to a particular person or group.

multi-racial: individuals who identify with multiple different races.

aha moments: specific moment(s) or event(s) in one's life that convinced them to pursue mathematics teacher education.

Summary

Teacher shortages, especially in STEM fields, is a growing concern all over the country. To address this issue, this study will examine how recruiting and retaining minoritized mathematics teachers can reduce the teacher shortage. In addition, the recruitment and retention of minoritized mathematics teachers can address another issue of minoritized individuals' disparities in learning and applying mathematics when compared to their White counterparts. This study will use narrative inquiry to discover similarities and differences amongst the different races of the participants through an interview and focus group format. Equity is an important factor when addressing mathematics disparities amongst different races. The next

chapter will provide a literature review and theoretical framework to guide the structure and findings of this study.

Positionality

Although, I did not immigrate to the United States, I am a first generation American. My parents, with very little formalized education, moved from South Korea in search for more substantive economic opportunities. Without the assistance of many, many allies, my parents could not have survived the transition to living and working in a new country. Upon arrival, they did not know many words in the English language. They were hard workers and instilled that work ethic into their children.

My parents were also the stereotypical strict, non-emotional type. I never saw my parents hug or kiss, I never heard them say I love you to each other or myself. I always knew they loved each other and their children, but I just never heard it. They could not help my older brother and me with our homework. They demanded high expectations for our academic career but never pushed us into a specific profession. I never had a close relationship with my parents growing up, I tried to remain respectful to their ideals and values but often questioned them as they were not American ideals. As I get older, my relationship with my parents keeps improving, and I, now, enjoy asking them about their own experiences they never told me about in South Korea as well as their transition to the United States.

I am a citizen of the United States of America. I was born and raised in Nashville, TN. I was born in Baptist Hospital. My birth certificate states my name is Nicholas Scott Kim. Nothing about that name besides the surname shows that I am minoritized, yet I have experienced overt and covert racism my whole life. I can remember coming home in elementary school crying because I was not White. I prayed to God asking why I had to be born Asian. I was treated very

differently by my peers. I had to navigate my Korean heritage with American societal pressures. I had to ask my mother not to pack me Korean food into my school lunchbox because I was made fun of for the appearance and smell of the food. After a soccer game in high school in which I did very well, I was told by the opposing players to go back to my country, that I was not welcomed here. I told them I was born here and that made no difference. I am often told that I speak English well by White strangers. I am often asked where I am from, and I usually reply by saying, “Nashville” until the person who raised the question becomes uncomfortable. I had issues with my own identity, but fortunately, I had sports as the great equalizer. Without sports and teammates, I would not have been able to develop as a person. I was very shy and quiet due to the fact I was uncomfortable with what I looked like.

I initially started my doctoral journey to pursue a degree in teacher education because I was having difficulty with the administration and students at what was then my current school. I was teaching Algebra 2 for the majority of my classes, and Algebra 2 is often referred to by our state as the most difficult mathematics class to teach. This is due to the fact that all students must finish Algebra 2, and there is a plethora of challenging standards students are required to master in Algebra 2. Nevertheless, I reached out to my master’s degree advisor hoping to seek a new opportunity. That opportunity did not arise until about two years after my inquiry about changing occupations.

My experiences as a minoritized teacher in secondary education has been a positive experience besides the occasional stereotypical jokes about my race expressed by some of my students or students in the hallways. I often ignored these comments when I heard them unless I felt the need to address something that was extremely inappropriate. My initial goal as a Korean American teacher was to connect with students as well as break any Asian stereotypes. I found

that engaging students about my interests in sports, hip-hop music, and video games facilitated making connections but also broke some negative stereotypes of Asians. In terms of my credibility, I was never questioned about my ability to teach mathematics from my peers, parents of students, nor administration, but that was not the case for a few of my African American colleagues. They were constantly questioned about their teaching ability as a whole, but only occasionally about their ability to teach mathematics. These teachers eventually left the school on their own or their teaching contracts were not renewed.

Similar to my secondary teaching experience, my experiences as a minoritized teacher educator have been positive. I have never felt out of place or that my voice is not valued. Actually, I experience the opposite. I feel as if my colleagues and superiors are interested in my voice and opinion and often seek my perspective. I believe the university as a whole, including, the teacher education department, is focused on the call to diversify the instructors, professors, and students.

These insights as a minoritized mathematics teacher and teacher educator provide a unique perspective that allows me to be able to examine the participants' experiences as minoritized PSTs. Similar to their experiences, I often felt like the token minoritized individual in most of my undergraduate and graduate courses. I often felt pressure to speak for the minoritized group as a whole when I did not feel comfortable. I always felt my experiences were unique to my situation but now understand the transferability in talking about my experiences. I have come to realize that minoritized PSTs may need to be explicitly introduced to minoritized teacher issues, because they may not know that their experiences as teachers could be different from their White counterparts.

The next chapter will provide a literature review including a theoretical framework to guide the methods and findings of the study. Chapter 3 will provide the structure of the study by providing reasoning and justification for the methodology of narrative inquiry. Chapter 4 will provide the insights gained from the individual narratives and resonant narrative threads based on the participants' interviews. Lastly, Chapter 5 will provide responses to the research questions, implications for practice and research, reflection on my learning, and close with my final thoughts.

Chapter 2

LITERATURE REVIEW

This review of literature is meant to provide background and to position the current study within the landscape of mathematics education research. To this end, I begin by introducing literature on equity in terms of access with identity in mind. Next, I share an overview of the literature on how teachers address inequities in education by disrupting systems of privilege and marginalization. Afterwards, I examine the current situation in education, specifically related to minoritized teachers and students in mathematics education. This section examines minoritized teacher recruitment and its impact on education. Next, I will discuss whiteness and its impact on equity in mathematics education. Next, I will review teacher retention and, more specifically, mathematics teacher retention. Lastly, I will introduce the theoretical framework of identity within mathematics education.

Equity in Education

Banks and Banks (1995) defined equity pedagogy as "teaching strategies and classroom environments that help students from diverse racial, ethnic, and cultural groups attain the knowledge, skills, and attitudes needed to function effectively within, and help create and perpetuate, a just, humane, and democratic society" (p. 152). This definition suggests helping students to develop basic reading, writing, and computational skills without emphasis on becoming "reflective and active citizens of a democratic society" (p.152) is not equity. Teaching diverse students to fit into society where existing structures are built upon class divisions and racial inequities are not building a just society. Banks and Banks (1995) believed equity pedagogy requires skills to be beyond basic skills in order to become effective agents for social change. Banks and Banks (1995) stated that, "education within a pluralistic democratic society

should help students to gain the content, attitudes, and skills needed to know reflectively, to care deeply, and to act thoughtfully" (p. 152) rather than accepting a dominant culture norm without questioning and reflecting on its merit. This definition of equity pedagogy sets the stage to focus on access, not only in terms of curriculum, but also in terms of individuals' identities, experiences, and resources as members of minoritized communities which will be discussed more thoroughly in the theoretical framework.

For the purpose of the study, the theme of access, connected to claims of redistribution and recognition, defines equity in education. This study uses Cazden's (2012) beliefs on equity in education, more specifically educational recognition, as a means of ensuring access. Educational recognition is defined as access in terms of providing an intellectually rich curriculum for all students, especially those from families and communities that have been denied access in the past (Cazden, 2012). From this discussion of equity in education in general, I move to address equity within mathematics education, again reflecting the theme of access.

Drawing from the work of Cobb et al. (2011) on equity in mathematics education, I define equity within mathematics education using three aspects. The first aspect, influenced by Delpit's (1988) and Bruner's (1987) work, focused on students' development of mathematical reasoning that provides authority and relevance beyond the classroom context (Cobb et al., 2011). The second aspect, influenced by Secada's (1995) work, concentrated on student access to enroll and succeed in future mathematics courses, "particularly those that serve as gatekeepers to future educational and economic opportunities" (Cobb et al., 2011, p. 170). The third aspect, influenced from Dewey's (1913 & 1975) and Nicholls' (1989) work, focused on student motivation and the significance of cultivating students' mathematical interests (Cobb et al., 2011). Therefore, equity in mathematics education provides mathematical authority beyond the

classroom, access to be successful in future mathematics courses, and increasing student motivation by fostering students' interest.

Equity perspectives in mathematics education that focus on the idea of access. I draw on the work of Cobb and colleagues (Cobb et al., 2011; Cobb & Hodge, 2002), Lipman (2004), and Gutiérrez (2001) to describe different aspects of this framework. Highlighting access to practices, Cobb and Hodge (2002) viewed equity as "concerned with how continuities and discontinuities between out-of-school and classroom practices play out in terms of access" (p. 252). As one interacts with multiple experiences throughout life, out-of-school as well as in the classroom, "people construct and reconstruct identities as they engage in the concrete social relations" (p. 265) that are part of given spaces. These identities are fluid and can change through the various life experiences such as immigrating to a new country or fighting racial stereotypes based on societal misconceptions. Cobb and Hodge (2002) argued that, "only as people participate in local communities of practice that discourses can touch their experience and become personally meaningful. It is at this local level that people mutually construct their individuality in relation to each other even as they imagine how their local engagement fits into the bigger scheme of things" (p. 279). Their work highlights how participation in various communities can provide or limit access to practices and identities that individuals develop. To address equity in mathematics education, one must examine individual identities and how those identities are constructed through individuals' experiences within their multiple communities. Continuing with the theme of access, Lipman, on the other hand, focused equity more on the mathematical resources and highly qualified staff while also considering identities.

Lipman (2004) discussed the "equitable distribution of material and human resources, intellectually challenging curricula, educational experiences that build on students' cultures,

languages, home experiences, and identities; and pedagogies that prepare students to engage in critical thought and democratic participation in society" (p. 3). Lipman (2004) described issues of access that called for better mathematical resources and highly qualified staff for those students and schools that have been neglected in the past. He also believed teachers should be prepared to incorporate relevant curricula that push their students to be more aware of their surroundings. When curriculum can provide opportunities to question and even challenge practices that structure inequality, students can move beyond mathematical competencies to developing mathematical authority within the classroom. This mathematical authority can provide students with the confidence to use their abilities beyond the classroom context to uncover inequities in society. Similarly, Gutiérrez (2001) described inequities for minoritized students and sought to differentiate equity versus equality in mathematics.

Gutiérrez (2001) argued that equity does not mean equality. Equity requires that public institutions, recognizing present and past inequities, contribute to rectifying the economic and social inequalities and injustices of today. She also argued that in an equitable world, one should not be able to predict certain outcomes solely from examining students' race, class, gender, or another characteristic (Gutiérrez, 2001). This point aligns with the idea of mathematics as a gatekeeper mentioned earlier in Cobb et al. (2011).

As another point, Gutiérrez (2008) warned against solely focusing on gap-gazing in mathematics education research. The achievement gaps among each race only show a portion of the story of student mathematical success. As she mentioned, there are many more factors beyond a standardized test score that factors into mathematical success. In addition, focusing on gaps of achievement between races is implausible as there are many different cultures, nationalities, and ethnicities within one race. She explained that in an equitable society, access to

enroll and succeed in future mathematical courses should not be predicted through race. However, there seems to be a vast discrepancy in the proportion of minoritized students within high-level or honors level mathematics classes (Jefferies & Silvernail, 2017; Kanno & Kangas, 2014; Whiting & Ford, 2009). Finally, Gutierrez emphasized the usefulness in understanding experiences from the participants' perspectives in order to examine diversity that may not be clear when we identify students only in terms of racial categories.

Taken collectively, these studies point to a lens that focuses on understanding participants' perspectives on their experiences and examining these experiences in terms of access to resources, identities, and practices related to becoming minoritized mathematics teachers. The next section moves to the relevant literature that expounds upon why teachers matter – starting with an examination of systems of privilege and marginalization that may hinder access to equitable teaching practices for underrepresented students and an examination of how teachers can disrupt these inequities using three strategies.

Teachers Disrupting Systems of Privilege and Marginalization to Support Equity

Systems of privilege and marginalization exist within our society and economy and have filtered down to education. These systems can be hidden within standardized performance measures seen by the statistics on standardized mathematics tests, increased surveillance of teachers, and/or control of curriculum to name a few (Kaur, 2012). This section will examine three strategies that address how all teachers can disrupt systems of privilege by (a) enacting culturally relevant education (CRE) into their curriculum, (b) addressing cultural issues in PST education programs and professional development, and (c) agreement amongst all individuals that change must occur.

The first strategy to facilitate the disruption of systems of privilege is for teachers to enact ideals from CRE into their curriculum. The call for teachers to engage students in culturally relevant education began with the work of Gloria Ladson-Billings and William Tate. These researchers started examining critical race theory as a conceptual framework for theorizing and understanding race and racism in education (Gist, 2018; Ladson-Billings, 2013). Aronson and Laughter (2016) traced multicultural education through various concepts – such as culturally appropriate (Au & Jordan, 1981), culturally congruent (Mohatt & Erickson, 1981), culturally responsive (Cazden & Leggett, 1981; Lee, 1998), and culturally compatible (Jordan, 1985) – that emerged in the academic literature (Brown-Jeffy & Cooper, 2011; Sleeter, 2012). From this foundation, two major strands emerged in educational research. One focused on teacher practice, as exemplified in the work of Geneva Gay (1975, 1980, 2002, 2010, 2013), and culturally responsive teaching (Aronson & Laughter, 2016). The second focused on teacher posture and paradigm, as expressed in the work of Gloria Ladson-Billings (1994, 1995a, 1995b, 2006, 2014), and culturally relevant pedagogy. While defining the difference between teaching and pedagogy, both strands strongly incorporated equity in the education (Aronson & Laughter, 2016). Equity education focuses on the ways in which benefits and burdens are distributed among the members of the education atmosphere. This could include fairness in which their communities provide, protect, and recognize the means and qualities individuals require to determine a fair and equitable life. Dover (2013) combined research strands centered on effectively teaching diverse students and developed an inclusive framework labeled CRE.

Aronson and Laughter (2016) synthesized that the engagement of CRE resulted in positive impacts on five domains that often correlate with higher test scores. These domains included: increases in student motivation (Bui & Fagan, 2013; Civil & Khan, 2001; Dimick,

2012; Ensign, 2003; Hill, 2012; Tate, 1995; Wortham & Contreras, 2002); increases in student interest in content (Choi, 2013; Dimick, 2012; Ensign, 2003; Feger, 2006; Gutstein, 2003; Martell, 2013; Robbins, 2001); increases in student ability to engage content area discourses (Civil & Khan, 2001; Gutstein, 2003; Martell, 2013); increases in student perception of themselves as capable students (Robbins, 2001; Souryasack & Lee, 2007); and increases in confidence when taking standardized tests (Hubert, 2013).

In addition, Ladson-Billings (2014) and Paris and Alim (2014; 2017) have worked to extend CRE with the addition of hip-hop pedagogy and culturally sustaining pedagogy. These researchers seek to "incorporate multiplicities of identities and cultures that help formulate today's youth culture. Rather than focus singularly on one racial or ethnic group, their work pushes us to consider the global identities that are emerging in the arts, literature, music, athletics and film" (Ladson-Billings, 2014, p.82). Paris and Alim (2014) were critical of how hip-hop culture existed in education so they developed hip-hop pedagogy focusing on using youths' interest in hip-hop to hook in the students, but moving beyond old hegemonic, hierarchical structures that incorporated outdated teaching practices. Many new and younger teachers grew up in the hip-hop culture. They have the ability to draw on their past experiences in relation to movies, athletics, or musical references that can be more relatable to their minoritized students. When teachers can incorporate youth culture into their lesson plans and curriculum that go beyond surface level mentions of popular culture, students will become more interested in the topics at hand. This is not an easy task for teachers to integrate youth culture into standardized state or national curriculums, but new or younger teachers who grew up in a similar culture may have more experiences and references that could motivate student interests.

The second strategy focuses on teacher preparation programs and in-service professional development's ability to incorporate culturally responsive pedagogy and CRE ideals as frameworks that challenge future and current teachers to disrupt biases, engage sociopolitical consciousness, and draw on the cultural assets of their students (Howard, 2013; Paris & Alim, 2017; Yosso, 2005). Howell et al. (2019) also called for teachers and educators to replace the hidden and null curricula with explicit curricula that reflects the knowledge and contributions of minoritized students and acknowledges the connections between communities and schools (Berry, 2005; Hill-Brisbane & Dingus, 2007; Ware, 2006).

Teacher educators and preparation program faculty must also understand and integrate the epistemological and ontological orientations that explicitly address inequities. They must be willing to engage in the conversation to bring change to inequitable practices within education. Researchers, administration, and content specialists must also design professional development opportunities for all current teachers to draw upon effective pedagogies and practices of effective teachers incorporating CRE as a medium for helping minoritized students sustain their cultures and knowledges. This can enhance the sociopolitical consciousness of all students for academic and life success.

Lastly, Milner et al. (2013) introduced the lack of agreement amongst all parties as a hinderance to disrupting systems of privilege. "Racial equality and equity for people of color will be pursued and advanced when they converge with the interests, needs, expectations, benefits, and ideologies of White people" (Milner et al., 2013, p. 342). Milner et al. (2013) believed it is difficult for systems to change because different individuals interpret what is just. The beneficiaries to the system "struggle with losing, sharing, or negotiating the advantages,

privileges, and benefits they have enjoyed that might transform the system (Milner et al., 2013, p. 345).

A current example would be how the statement “Black Lives Matter” is countered with “All Lives Matter”. Until stakeholders definitively agree there are inequities within the educational system, it is going to be extremely difficult to completely restructure the current system that has historically been in place since post-slavery and Brown vs. Board of Education (Andrews et al., 2019). But as long as there are some stakeholders who believe in the inequities present within society and our educational system, the strategy to move towards impactful equitable changes gives us hope to break down and disrupt the marginalization of our minoritized students by relying on these leaders and researchers to bring racial issues to the forefront. In the current state of frequent protests against police brutality on Black citizens, teachers can strive to make an impact on the racial inequities in this country. Currently, the nations’ attention to systematic racism and police brutality is stronger than it has been in a long time or even ever. Those who were passive against systematic racism have become active anti-racist protestors who encourage others to resist being a passive, non-racist. This may be a time where the most attention on equity is at an all-time high. The next section will examine how the recruitment of minoritized teachers takes on a broader significance than just diversifying the teaching workforce and how they can disrupt systems of privilege in four keyways.

Diversity Disrupting the Systems of Privilege and Marginalization

Minoritized teachers can disrupt systems of privilege and the marginalization of minoritized students in four key ways. First, minoritized teachers can employ their own cultural knowledge and understandings to develop curriculum that connects to minoritized students’ lives and unique experiences in ways that some, but not all, White teachers can only research rather

than experience firsthand (Howell et al., 2019). For example, Vickery conducted a multiple case study of two Black women social studies teachers. Vickery (2016) found that they drew on their cultural knowledge to develop curriculum that connected to students' lived experiences. Many Black women teachers, like the ones in Vickery's study, have employed culturally relevant practices because of their desire to connect Black sociocultural experiences with Black students' classroom experiences (Howell et al., 2019; Coffey & Farinde-Wu, 2016; Vickery, 2016; Williams, 2018).

Kohli's (2012) study highlighted how the critical consciousness of Black, Latinx, and Asian PSTs about race and its intersection with other identities impacts their pedagogy and interracial solidarity. Furthermore, minoritized teachers are more likely to enact a critical race pedagogy in the classroom (Foster, 1997; Jennings & Lynn, 2005; Lynn, 1999; Lynn et al., 2013); this can be essential for centering race and taking intersectional approaches to understanding how to effectively meet the needs of historically and traditionally marginalized students in school. The impact of critical race pedagogy and CRE methods in classrooms applied by minoritized and White teachers show a positive influence on all student's mindsets and perceptions on learning.

A second way minoritized teachers can disrupt systems of privilege and marginalization is to resist the marginalization of nondominant perspectives of teaching and learning (Gist, 2014). Gist (2018) found that minoritized teachers highlight intellectual, leadership, and pedagogical strengths for students such as:

- act as warm-demanders with high-expectations (Irvine, 2003);
- possess an equity mindset and confront race and racism in the classroom (Grissom & Redding, 2016; Villegas & Irvine, 2010);

- serve as cultural and linguistic bridge builders (Villegas & Davis, 2008);
- and have a significant impact on academic and non-academic measures (Dee, 2004; Eddy & Easton-Brooks, 2011; Egalite et al., 2015).

Additionally, Gist (2018) concluded some minoritized teachers frequently cannot escape or disassociate with self and systematic tensions because their teaching and learning experiences are directly implicated by systematic barriers. Therefore, some minoritized teachers are constantly contemplating disrupting systems of privilege in their teaching practices while White teachers may be able to avoid uncomfortable conversations (Larke, 1990).

Third, minoritized teachers can serve as role models of successful minoritized individuals who have strived through the personal struggle of having multiple identities based on their race. Some teachers who are labeled as minoritized individuals due to their race or ethnicity have experience in effectively navigating through finding their own unique identity as well as traversing through their identities as a professional, student, or general person in society. Andrews et al. (2019) believed minoritized teachers can "foster the development of students and future citizens who have cross-cultural relational skills, disposition of cultural humility, and a critical consciousness to operate differently in the world having reflected upon their own stereotypes and biases" (p. 9). Andrews et al. (2019) also believed representation matters in the teaching profession. Minoritized students need to physically see teachers of different races to be role models of success from minoritized people. Andrews et al. (2019) also offer:

> recommendations for building capacity with respect to a diverse teacher workforce include minority teacher involvement in the recruitment of new hires to ensure a diverse representation in these selection pools; greater attention to anti-oppression and social justice courses at the in-service level; recognizing that all students benefit from a diverse

> teacher workforce; a closer examination of policies and practices that limit or thwart hiring a diverse representation of teachers; ensuring opportunities for teachers to develop supportive communities of practice; and recognizing the insider/outsider position of many historically marginalized teachers. (p. 10)

Fourth and finally, the social and academic strengths of minoritized teachers teaching minoritized students is reflected in the research literature. For example, Andrews et al. (2019) reviewed qualitative studies conducted by The Education Trust. The studies revealed Latinx teachers were found to relate well to all students, served as role models for Latinx students, and aided minoritized students in navigating systems and obstacles in society that can thwart their achievement (Griffin, 2018). Black teachers reported holding high expectations for their students and empowering them with critical knowledge. They believed they had an easier time developing trusting relationships with Black students and being able to empathize with their out-of-school experiences given certain cultural similarities (Griffin & Tackie, 2016).

Similarly, Dee (2005) found that racial, ethnic, and gender-matched teachers have more positive perceptions of students, which affect educational opportunities and classroom environment. In addition, research indicated that minoritized teachers assist in helping minoritized students feel more welcome at school (i.e., serve as cultural ambassadors), and are highly rated by all students (Carver-Thomas, 2018; Dilworth & Coleman, 2014; Griffin, 2018; Griffin & Tackie, 2016; Irvine, 2002). Clearly, minoritized teachers engage in practices that can challenge systems of power. The next section will address how minoritized teachers, without careful consideration, can perpetuate systems of privilege in four different ways.

Minoritized Teachers Can Perpetuate Systems of Privilege

Minoritized teachers knowingly or unknowingly can perpetuate systems of privilege in different forms. Some minoritized teachers are impacted by white gaze, token teaching, diversity for the White agenda, and historic White norms imposed in PST education programs across the nation. Howell et al. (2019) believed some researchers, educators, and practitioners are blinded by white gaze. White gaze completely centralizes White culture as the main point of view. It discredits other minoritized individuals' lived experiences and cultures as valuable funds of knowledge. Unfortunately, the white gaze point of view still exists in research and perpetuates marginalizing the notions of minoritized youths' worth, potential, and behaviors. It is important to note that minoritized teachers can perpetuate the same White norms from the white gaze point of view by "acting white" (Battey & Leyva, 2016, p. 75).

Gist (2018) believed "calling out the importance of Teachers of Color is an empty symbolic gesture if their voices, perspectives, and experiences are not yoked with policy and practice changes that honor their contributions to the teaching profession" (p. 517). Gist (2018) argued that only acknowledging the importance of minoritized teachers without policy and practice changes does not actually disrupt the systems of privilege but rather puts a temporary hold on impactful actions that could actually benefit disrupting the systems of privilege. Similarly, Flores (2011) informed the educational community that hiring of one minoritized teacher can produce token teachers that also places a temporary fix to a majority White dominant teaching profession. Unfortunately, some stakeholders believed that hiring one minoritized teacher can solve their diversity issue (Flores, 2011).

On the other hand, Brown (2014) contemplates the potential for calls for diversifying the teacher workforce to be driven by White interests by raising some interesting questions: "Does

this call for bringing in more teachers of color simply provide more experiences for White preservice teachers to interact with peers that may come from different racial backgrounds and have diverse experiences than their own? Does the call also provide a way to place the responsibility for closing the opportunity gap found between many K-12 students of color and their White counterparts back on teachers of color" (p. 339)? In addition, Sleeter (2017) notes,

> White interest in educator preparation, despite calls to diversify the teacher workforce, is maintained through the racial composition of faculty, streamlined and depoliticized content of multicultural education courses, and the relationship between teacher education programs and the university. The contradictory commitments indicated in mission statements with the structural reality of limited participation by and commitments to Teachers of Color in traditional educator preparation programs spotlights the potential snares that stymie the advancement of racial/ethnic diversity in the educator workforce. (As cited in Gist, 2018, p. 517)

Andrews et al. (2019) reported that "teacher education programs at historically and predominately White institutions in North America tend to replicate the current demographic qualities of the teaching profession: White, middle-class, Christian, female, cis-gendered, heterosexual, U.S. born, and for whom English is a first language" (p. 8). In addition, Andrews et al. (2019) warned potential minoritized teachers:

> who gain entrance into a preservice program at a predominantly White institution, they encounter a number of additional obstacles as prevailing ideologies of whiteness permeate and inform the work of school. These include, but are not limited to, experiences with overt and covert racism (Jones & Maguire, 1998; Kohli, 2009); linguicism (Lippi-Green, 1997); stereotyping (Cole & Stuart, 2005; Griffin, 2018);

> microaggressions (Endo, 2015); color-blindness (Johnson, 2002); being rendered the professional "Other" (being viewed as a cultural expert) (Santoro, 2015); homogenizing racial and ethnic groups (Lander, 2014); lack of support within the faculty (Cho, 2013); a perception that ethnic and racial diversity is sought by employers and as such racialized teachers are "taking" the jobs of the dominant group (Ryan et al., 2009); and an assumption of a level playing-field (Coates, 2010). (p. 8)

Andrews et al. (2019) warned potential minoritized teachers to challenge the White norms placed in predominantly White institutions, if not, they are perpetuating stereotypes and inequities. I believe it is extremely difficult to challenge the norms placed in one's TEP. Any student interested in teaching has a plethora of new knowledge to learn and experience, where students are almost surviving to get through their coursework as well as their social lives. A minoritized PST with all of the same requirements of a non-minoritized PST can easily fall into norms of the college and may not be seeking to challenge the norms of a program when they are trying to succeed within that program. There is a lot of emphasis that minoritized teachers should combat these racial norms, but often times minoritized PSTs are struggling with more issues than the non-minoritized PST, therefore, is reluctant to challenge racial obstacles. It is a tall task of which Andrews et al. warns potential minoritized teachers, but without recognition of an issue, there cannot be any change. TEPs should provide more opportunities for all teachers to prepare to combat overt and covert racism in school. The next section will examine the current situation in education by reviewing the importance of recruiting minoritized teachers who can impact the learning and doing of all students, especially minoritized students, in mathematics. In addition, the section thereafter will examine whiteness, specifically, in mathematics education and its impact on equity.

Minoritized Teacher Recruitment and Impact

This section examines reasons why there may be a lack of minoritized teachers in our schools, as well as reasons why the recruitment of minoritized teachers can make an impact on their students, especially minoritized students. Gordon (1994) found multiple reasons on why there was a lack of minoritized teachers in our teaching force: “a shortage of minoritized teachers is embedded in a context of school desegregation, higher elitism, racism, poverty, and urban decay” (p. 346). Gordon (1994) found many themes through her qualitative research study conducted through face-to-face, semi-structured interviews with 150 minoritized teachers across the nation. Her research focused on why minoritized teachers were not entering the field of teaching. Her respondent themes were broken down into education experience, cultural and community concerns, and social and economic obstacles.

The recurring comments made by minoritized teachers about educational experience included: not graduating from high school, lack of preparation, negative experience in school, poor student discipline/lack of respect, teachers not prepared for diversity, and lack of support in college (Gordon, 1994). On the other hand, comments about cultural and community concerns focused on lack of academic encouragement, racelessness, absence of role models, low status, too much education for the return, and teaching not being attractive to some ethnic groups. Lastly, social and economic obstacles revolved around low pay, negative image, poor school conditions, more opportunities elsewhere, and racism. Gordon (1994) also believed “token representation of minoritized teachers will in and of itself not attract more students of color to the profession” (p. 352). Although some minoritized representation is better than none, we need to increase the number of minoritized individuals beyond one or two teachers as it needs to be seen as a common occurrence instead of an anomaly. Fortunately, researchers such as Dentzer and

Wheelock (1990), Moore and Pachon (1985), and others have found reasons for the need to increase minoritized teachers.

We begin by noting some reasons why minoritized teachers have entered the teaching profession and then move onto reasons why increasing the number of minoritized teachers in the workforce is important. Dentzer and Wheelock (1990) and Moore and Pachon (1985) both found increasingly low academic performance of minoritized youth and the need to lessen the gap from their White counterparts as motivation to pursue teaching. Hillard (1988) found the desire for minoritized individuals to educate their own people. Banks and Banks (1989) researched the need for all children to experience a multi-ethnic teaching force. Gay (1990) found a desire for a more honest representation in the curriculum of the diversity of ideas and skills that have contributed to the development of the nation. Haberman (1989) addressed the issue that there is a potential supply of teachers in urban and ethnic communities that is not proportionate to the minoritized student enrollment in TEPs with traditionally white student bodies.

Cherng and Halpin (2016) performed a quantitative study using the Measure of Effective Teaching database. A sample of 1,680 sixth through ninth grade teachers found that students' perceptions of teachers vary by race/ethnicity. Black students have more positive perceptions of their Black teachers than White teachers in urban schools (Cherng & Halpin, 2016). Additionally, Ladson-Billings (1994) in her study of successful teachers who work with Black youth, *The Dreamkeepers,* describes the connection that can be made between minoritized teachers and students:

> Valentine, an African American woman in her midforties… has taught in both inner-city and suburban schools. Her experiences with teaching more affluent white students has convinced her that African American students have special strengths that are rarely

> recognized in schools… enjoys teaching African American students she says she identifies so closely with them: "when I look at my children I see myself… I also know that being smart has nothing to do with skin color. (p.46)

Furthermore, Cherng and Halpin (2016) found that Asian American students also reported positive perceptions of Black teachers in the same schools. Latinx students, however, did not report statistically significant findings with Latinx teachers in Urban schools. There was no significant evidence that students and teachers had to be of the same race/ethnicity in order for the minoritized students to have positive perceptions of their minoritized teachers (Cherng & Halpin, 2016). "Prior qualitative and theoretical work has long argued that minoritized teachers are able to relate more easily with minoritized youth - the largest growing student demographic - by drawing from their own experiences navigating society as nondominant person" (Cherng & Halpin, 2016, p. 412). It would be extremely difficult and unjust to place Black students with only Black teachers or Latinx students with Latinx teachers, so this study is important to show that any minoritized teacher can have some positive effect on any minoritized student.

Cherng and Halpin (2016) also claimed minoritized teachers are particularly well perceived by minoritized students because minoritized teachers may have personal experience navigating racial stereotypes about academic achievement and can equip students to combat these stereotypes. Minoritized students are often looking for role models who can give personal experiences on how they overcame similar difficulties and provide positive reinforcement on navigating through unfamiliar territory of a minoritized person living in a world that encourages assimilation to the majority. This section provides reasons why minoritized teachers did not pursue the teaching profession in the past, while also offering representation, voice, and experience of different cultures as reasons why we need minoritized teachers. It also provides

scope on the positive perceptions students have on minoritized teachers. The next section will further examine how minoritized teachers impact students in mathematics.

Minoritized Teachers Mathematical Impact

Minoritized mathematics teachers facilitate the learning and doing of mathematics for minoritized students in various ways. This section will address how minoritized mathematics teachers' perception as role models positively impact student achievement, how standardized test achievement of minoritized students is improved through minoritized mathematics teachers, and how use of CRE can positively impact one's attitudes toward mathematics as well as increased confidence in the ability to do mathematics.

As mentioned previously, Cherng and Halpin (2016) claimed minoritized teachers are particularly well perceived by minoritized students because minoritized teachers may have personal experience navigating racial stereotypes about academic achievement and can equip students to combat these stereotypes. Minoritized students are often looking for role models who can give personal experiences on how they overcame similar difficulties and provide positive reinforcement on navigating through unfamiliar territory of a minoritized individual living in a world that encourages assimilation to the majority. Especially in the field of mathematics, having positive role models who have broken racial stereotypes about mathematics capabilities provides students with an improved perception of mathematics as doable. This in turn, reduces mathematical anxiety for some students.

On the other hand, when considering standardized assessments, Dee (2001) designed a randomized experiment to determine the effect of class size on student achievement in schools across Tennessee using the Project STAR Public Access Data. The resulting data was used to examine the effect on student performance by student assignment to a same-race teacher using

OLS and 2SLS regressions. Due to small sample sizes for Latinx and Asian students, analysis was limited to Black and White students. Dee concluded that models of student achievement that a 1-year assignment to an own-race teacher significantly increased the math and reading achievement of both Black and White students by 3-4 percentage points. These results were even more impactful for lower-income Black students in segregated settings and particularly with inexperienced teachers. Although as mentioned before, reducing achievement gaps should not be the only focus; it is important to recognize the positive effects minoritized teachers may have in addressing the perceived gap even if there are other factors involved that may improve student mathematical achievement.

Similarly, when addressing CRE and assessments together, Hubert (2013) conducted a case study examining Black students' perspectives on the effects of culturally relevant mathematics instruction on their attitudes and interests toward mathematics. On average, Hubert found students who participated in the culturally relevant mathematics lesson increased by at least one letter grade and the students felt more confident taking their statewide assessment (Hubert, 2013).

In summary. The growing need for more teachers, especially mathematics teachers, could be curtailed by recruiting and retaining minoritized mathematics teachers. The growth of minoritized students that now comprise of 52% of the public-school student population (McFarland et al., 2018) encourages researchers to find methods to combat inequities in the educational and societal systems of privilege and marginalization. The focus of this section is to outline how minoritized teachers can disrupt but also perpetuate these systems, especially in mathematics education.

Minoritized mathematics teachers disrupt systems of privilege and marginalization by incorporating their own cultural and lived experiences to relate to their minoritized students. They provide minoritized students with role models and seek to incorporate culturally relevant education into their curriculum more readily than White preservice teachers who may feel unprepared or uncomfortable teaching CRE due to the lack of real lived experiences dealing with minoritized cultures (Larke, 1990). Minoritized mathematics teachers have reduced mathematics anxiety and raised standardized test scores for minoritized students by seeking curriculum that is personal and meaningful to their students.

Realistically, increasing diversity of the teaching workforce cannot disrupt past systems of privilege and marginalization of minoritized students and teachers by itself. A suggestion for future implications would be for stakeholders to recognize the need to incorporate CRE methods into all preservice TEPs as well as in-service professional development to educate and provide more exposure and experiences that can make CRE more impactful for all students. It is also integral that the concept of needing all individuals working towards the same goal (Milner et al., 2013) is recognized as a hinderance to disrupting past systems of privilege and marginalization. That said, such recognition should not discourage stakeholders, especially non-minoritized individuals, to provide a voice to the issues of racially inequities. Stakeholders must be in consensus about the need to disrupt these systems or impact may be reduced to a temporary fix. It is also important for minoritized teachers to recognize they can perpetuate these systems if they do not purposely try to combat the centralizing of the White norms in predominately White institutions, whether in preservice teacher education programs or within their own schools (Andrews et al., 2019). If minoritized teachers do not bring the issues to the forefront in their preservice programs, albeit a daunting task, those that are unaware of these racial inequities will

continue to enact traditional teaching practices that privilege White students while marginalizing the minoritized students. Luckily, minoritized preservice teachers are not alone. Many researchers in mathematics education, whether minoritized or not, are striving to incorporate more CRE into their educator programs. The next section will examine whiteness and how it impacts equity in mathematics education. The current state of mathematics education is engulfed with racism and White privilege.

Whiteness in Mathematics Education

Whiteness is a prevalent ideology in almost all parts of society in the United States (Battey & Leyva, 2016; Leonardo, 2004; Lewis, 2004). Whiteness and concepts such as White supremacy, White privilege, and racism are intertwined and evaluated by Battey and Leyva (2016) to develop a framework to decentralize whiteness in mathematics education. In terms of whiteness in education, "whiteness subjugates historically marginalized students of color (e.g., different forms of micro- and macro- aggressions) and their agency in resisting this oppression, as well as to make visible the ways in which whiteness impacts White students to reproduce racial privilege" (Battey & Leyva, 2016, p. 50). Battey and Levya (2016) and Leonardo (2004) defined White privilege as White individuals who benefit from racism of non-White individuals. Alternatively, White Supremacy was defined as "the systemic maintenance of the dominant position that produces White privilege" (Battey & Leyva, 2016, p. 50). In other words, Battey and Leyva (2016) stated that "whiteness is the ideology that maintains White supremacy, valuing one racial group over others. Thus, the foundational ideology of whiteness maintains a system of White supremacy, which produces privilege" (p. 50). To incorporate racism and whiteness, Battey and Leyva (2016) drew from the work of Kivel (2011) when they found that "whiteness is

a constantly shifting boundary separating those who are entitled to have certain privileges from those who exploitation and vulnerability to violence is justified by their not being white" (p. 17).

Battey and Leyva (2016) believed whiteness is a foundational concept for racism. An ideal race is created in which other racial groups are seen as inferiors. Other racial groups are devalued and consequently oppressed. Therefore, whiteness has a dual nature in which White individuals are privileged and everyone else is oppressed. Whiteness impacts all individuals in mathematics education from administrators to teachers and parents to students. Battey and Leyva (2016) created a framework "not merely to name White privilege in mathematics education but rather document the institutional ways in which White supremacy in mathematics education acts to reproduce subordination and advantage" (p. 51). Battey and Leyva (2016) believed the lack of attention to whiteness from mathematics researchers and educators perpetuates the invisibility of White privilege and supremacy and neutrality in documenting mathematics as a racialized space. Battey and Leyva (2016) drew from the work of Martin (2009) where he "calls for the de-silencing of race in mathematics through ideologies of colorblindness and whiteness by actively acknowledging students' co-constructed academic and racial identities as well as producing opportunities to engage with mathematics as a tool for social change" (p. 49).

Battey and Leyva (2016)'s framework of whiteness in mathematics education encompassed three main dimensions of White institutional space: institutional, labor, and identity. The institutional dimensions focused on four elements: ideological discourses, physical space, history, and organizational logic. Organizational logic is defined by Acker (1990) and used by Battey and Leyva (2016) as "what determines who has power, who does what work, and who evaluates whom" (p. 66). This is important later as the study will address the needs of the variety of stakeholders involved in mathematics education. The labor dimension focused on three

elements of cognition, emotion, and behavior. The last dimension of identity focused on academic (de)legitimization, co-construction of meaning, and agency and resistance. The next section will focus on general teacher retention research to reduce teacher shortages and then will move onto focus on the retention of mathematics teacher specifically. This study is positioned to provide more specific information into how to retain minoritized mathematics teachers. The next section will focus on teacher retention in general, then more specifically, mathematics teacher retention.

Teacher Retention

Teacher recruitment is only one part of the solution to reduce teacher shortages and increase minoritized teachers. Stakeholders must also consider retaining current veteran teachers as well as novice teachers just beginning their careers. Research has shown that effective TEPs for PSTs as well as mentorship during the first few years of teaching can drastically impact the longevity of a teaching career. Smith and Ingersoll (2003) explored the relationship between the components of teacher induction and retention using the NCES's Schools and Staffing Survey (SASS) from 1999-2000 and the Teacher Follow-Up Survey from 2000-2001. The study incorporated 3,235 first year teachers out of the 52,000 in the SASS data and focused on descriptive analysis on the incidence of induction, mentoring, and turnover for varying teacher characteristics. The researchers concluded that there was a 20% increase in formal induction programs for new teachers from the 1990's to 2000's (Smith & Ingersoll, 2003). They also concluded that public schools were more likely to receive some sort of induction support than private or charter schools (Smith & Ingersoll, 2003). Also, small rural schools were less likely to have an induction program in place. The most commonly reported induction supports reported from public schools were mentoring or supportive communication from a supervisor. Also, only

about 30% reported having a classroom aide of some type (Smith & Ingersoll, 2003). They also found that about 30% of first-year teachers moved at the end of their first year or about 15% left teaching in general. In addition, the highest rates of leavers were from charter schools, especially urban charter schools but also public rural schools (Smith & Ingersoll, 2003).

In addition, Hughes (2012) surveyed 782 teachers to determine the impacts of teacher, school, and organizational characteristics and teacher efficacy on teacher retention. The researcher used block-entry regression to determine that total years teaching, socioeconomic status, salary and workload, parent and students, and technology all had statistically significant contributions to the regression model. The data indicated that increasing salaries, reducing workloads, and increasing efforts to improve parent and student participation and cooperation levels could best address teacher retention issues (Hughes, 2012).

Rodriguez and Sjostrom (2000) took a different approach and explored a multicultural approach to mentoring and teacher retention for TEPs. They found institutional values, goals, and operational theories need to be examined when considering mentoring the new generations of teacher education faculty for diversity. They believe the need to promote multiple perspectives is central for increasing teacher diversity to become compatible with the nation's diverse society (Rodriguez & Sjostrom, 2000). Solomon and Rezai-Rashti (2001) found similar implications to TEPs in their interpretive one-year study of PST candidates' racial identity development and its impact on learning to teach. The researchers came across a concept of "dysconscious racism" which was defined as teachers unconsciously implementing institutional policies and practices that legitimize assumptions and stereotypes about racially minoritized individuals (Solomon & Rezai-Rashti, 2001). The study found there is an urgent need for more comprehensive anti-racism curriculum in teacher education and teaching (Solomon & Rezai-Rashti, 2001). The next

section will look at mathematics teacher retention, specifically, beginning with a comparison of Maslow's Hierarchy of Needs and Fisher and Royster's (2016) Hierarchy of Needs for a mathematics teacher.

Mathematics Teacher Retention

Secondary level core subject teachers such as mathematics and science teachers as well as special education teachers are the most likely to leave the teaching profession (Fisher & Royster, 2016). Multiple studies have reported different results as to why mathematics teachers leave the profession early, such as: not enough preparation in mathematics, stressful situations from poor student behavior and lack of administrative support, pressure from high stakes testing, desire for stronger professional development, lack of effective mentoring for new teachers, and lack of productive peer collaboration (Fisher & Royster, 2016). Fisher and Royster (2016) created an explanatory design experiment using qualitative data from interviews accompanied with quantitative data from a previous study to discover the needs of teachers in various stages of their careers. The researchers aimed to compare Maslow's Hierarchy of needs to the needs of the teachers in the study and found very similar stages between the two. The figure created by Fisher and Royster is located in Appendix E.

Teachers in the study, first needed to fulfil the subsistence stage of taking naps, working out, professional development, and more pedagogy courses in college. The next stage was the security phase where teachers needed to take care of themselves first, wanted a higher salary, more time for grading, health benefits, and possibility of retirement. After security came association, where teachers needed to be around others such as family, friends, and pets while some referenced religious needs. The next stage was the need for respect for the teaching profession. Teachers felt as though the teaching profession has lost prestige and needs to rebuild

its reputation. The last phase in both Maslow's and the teachers in the study was self-actualization. Teachers needed to write articles, develop curricula, write grants, present at conferences, and conduct meaningful research. Fisher and Royster (2016) believed teachers that can reach the last stage of the hierarchy would remain in the teaching profession the longest. Conversely, Hubbard et al. (2015) wanted to see what preservice education programs could do before teachers entered the field.

Hubbard et al. (2015) took a university approach to improving STEM teacher recruitment and retention. The researchers wanted to investigate more experiences to raise STEM teaching awareness to not only recruit more STEM teachers but also retain them at their current schools. Hubbard et al. (2015) described a STEM Master Teacher Job Shadowing experience, a STEM Day, NASA Aerospace Teachers Program, multiyear scholarships, and mentoring programs designed to give preservice teachers an authentic, sustained academic community of practice supported by high levels of engagement with invested STEM practitioners. Along the same lines, Tai et al. (2007) focused their study on types of school districts and what they can do to influence mathematics teacher retention.

Tai et al. (2007) researched factors influencing teacher retention of mathematics and science teachers and how certain types of districts can focus their teacher recruitment. The researchers used data sources from NCES's SASS of 1999-2000 and the Teacher Follow-up Survey for 2000-2001. Researchers found teachers who hold advanced mathematics or science degrees are less likely to stay in their original schools than those without those degrees, but teachers in higher earning brackets were 1.46 times more likely to stay in their schools versus those in lower earning brackets (Tai et al., 2007). These findings are somewhat contradictory as many school districts offer higher salaries to those with advanced degrees. Tai et al. (2007) also

concluded that, when considering age and new versus experienced teachers, rural schools struggle to retain teachers the most when compared to urban or suburban schools. Suburban and urban schools retained new teachers of older aged cohorts the most effectively (Tai et al., 2007). Contrarily, Hutchinson (2012) focused research on what schools themselves could do to retain STEM teachers.

Hutchinson (2012) conducted research on addressing the STEM teacher shortage by using the collective case study approach of three first-year STEM teachers. Hutchinson (2012) believed that an estimated 30% of beginning teachers leave the profession in their first two years of teaching. In addition, teacher turnover in urban schools is higher than other school settings. Through the case study narratives, Hutchinson (2012) identified the difficulty for prospective teachers to find information about TEPs hindered teacher recruitment. Hutchinson (2012) suggested "that the STEM teacher shortage can be addressed with a support team approach that includes effective recruitment into the teaching profession that is supported through scholarships and consistent academic advising and mentoring followed by induction-year mentoring and professional development" (p. 549). In trying to find effective recruitment strategies, most researchers tend to keep retention in mind as part of the end goal. Providing teachers with ample support during their PST training and first few years of teaching is an example of retention being a factor of recruitment strategies. This study seeks to identify factors that facilitate minoritized mathematics teachers, specifically, in staying in the teaching profession.

In summary. The existing literature on teacher shortages indicated that there is a teacher shortage in our schools, especially in STEM fields (Hutchinson, 2012). There is some debate on whether rural or urban schools are in need of these STEM teachers the most, but all school settings, including suburban schools, are in need of more qualified STEM teachers. One strategy

to reduce teacher shortages in STEM fields could be to recruit and retain teachers from underrepresented communities. This study uses equity as a framework for why minoritized teachers could impact all types of students. Specifically, when compared to their white counterparts in mathematics education, minoritized students have been consistently behind on standardized achievement tests (NAEP, 2009, 2011). There is evidence that minoritized teachers can positively impact minoritized students' achievement scores even when they do not share the same race or ethnicity (Cherng & Halpin, 2016). Minoritized teachers bring in their own experiences and help their students experience various types of cultures. Although, we are far from proportional representation of the student population, minoritized teachers give representation of certain racial groups that are not typically seen in our schools. These teachers can be seen as role models and provide minoritized students with a positive learning environment that may encourage them to consider teaching as a profession (Guarino et al., 2006).

The teacher shortage problem is not solved by only recruiting new teachers but also retaining them to stay in the profession. There are many reasons why teachers leave the profession such as low pay, high levels of stress, lack of support from mentor teachers and administrators, and lack of prestige in the field of teaching. Researchers, however, have formed some strategies to increase retention especially for STEM educators. First, effective teacher education programs need to hire strong field supervisors and professors who can provide constructive feedback and support. Along with strong university support, teacher education faculty must select strong teacher mentors in the classrooms where preservice teachers are beginning their field experience (Hubbard et al., 2015). In addition, teacher educator programs should promote diversity in teaching and learning while providing more mathematics pedagogy courses (Hubbard et al., 2015).

Retaining new teachers should also be a priority for school administrations and department heads. Administrators need to implement effective induction and mentoring programs to support novice teachers. In addition, schools and districts need to search for effective and relevant professional development opportunities for novice and experienced teachers to facilitate the growth of all teachers at different stages of their careers. Partnerships with surrounding universities can facilitate the search for effective, research-based professional development opportunities. Through various qualitative studies using interviews and case studies, researchers have identified a few strategies suggested by teachers to increase the sense of job security.

First and foremost, teachers ask for more competitive salaries. Unfortunately, policymakers are the only stakeholders who can make an impact on this issue. Along with increased salary, teachers would like to see a change in the prestige of teachers in the United States that has deteriorated over the years. Teachers also seek reduced workloads and class sizes to minimize stress levels. The final strategy to retain teachers is to aid teachers in reaching self-actualization. Universities should work with partnering school districts to encourage teachers to seek publication and research as well as develop their own effective professional development (Fisher & Royster, 2016). In addition, administrators can provide more incentives for teachers to seek research opportunities as well as presentation opportunities at local and national conferences. This study is designed to discover how narratives of minoritized mathematics PSTs could provide insight on how to recruit and retain minoritized mathematics teachers.

Summary

Equity and social justice frame this research study. All teachers can make a difference in disrupting systems of privilege and marginalization of underrepresented students based on race.

Three strategies address the ability to disrupt systems: incorporating CRE into current curriculum; addressing cultural issues in PST programs and professional development; and having teachers encourage everyone to work towards agreeing upon the need of eliminating inequities. More specifically, minoritized teachers can disrupt these systems in four key ways. First, minoritized teachers can use their own cultural knowledge to develop curriculum that is relevant to minoritized students. Second, they can resist the marginalization of nondominant perspectives. Third, representation of minoritized students matter, and the presence of role models can impact minoritized students' perception of themselves in positive ways. Lastly, minoritized teachers have specific social and academic strengths that can facilitate disrupting said systems. It is also important to talk about the complexity of the issue by acknowledging that minoritized teachers can also perpetuate systems of privilege.

Minoritized teachers have had many reasons in the past to avoid the teaching profession. But there are many reasons why increasing the number of minoritized teachers is important, including but limited to, having representation, voice, and diversity of teaching practices. Minoritized teachers can have an impact in mathematics that involves achievement, perceptions, and overall attitudes toward mathematics. Teacher retention is an important factor when considering teacher shortages. In addition, mathematics teacher retention can be examined through Fisher and Royster's (2016) hierarchy of mathematics teachers' needs.

Based on the literature, I anticipate that the individual experiences of minoritized PSTs have a significant impact on their decision to pursue the teaching profession. I suspect that their identity as minoritized PSTs factors into their decisions to pursue mathematics education, specifically. I believe that teacher educator programs aid their pursuit in becoming mathematics educators, but not enough is being done to equip them to battle racism, whiteness, and White

privilege in mathematics education. I anticipate that the needs of minoritized teachers for the purpose of retention are going to be different from the general hierarchy of mathematics teachers' needs due to the fact that PSTs actively think about their identity as minoritized individuals. Minoritized teachers face different challenges and may require different supports to meet their needs. The next section will expand on the literature on individual identity within education that informed the theoretical framework that guided the research questions, data collection, and analysis.

Theoretical Framework

The notion of identity informs the design of this study. An individual's identity is created as one participates in the social and cultural practices within a community of practice (Lave & Wenger, 1991). In this instance, concentrating on the involvement in social experiences also indicates a clear emphasis on the individual as a participant of the sociocultural community (Lave & Wenger, 1991). This situated perspective of identity comprises in what ways individuals see themselves, how society views them, and how they interpret these views in relation to their positions within communities of practice (Matheny, 2016). In addition, Hodges and Hodge (2017), drawing on Wenger (1998), described identity as a "constant becoming" where identities evolve based on their experiences within communities of practice.

More specifically and making identity more concrete, Gresalfi and Cobb (2011) and Hodges and Hodge (2017) identify one's "personal identity" as formed when one comes to associate with certain practices valued within a community. "The idea of personal identity provides structure to a narrative approach by focusing our attention on the normative ways of acting and valuations of these norms from a participant's perspective (Hodges & Hodge, 2017, p. 104)." In this way, the notion of personal identity informs the design of this study by focusing

attention on whether or not and to what extent PSTs experiences as minoritized individuals influenced their decisions to pursue mathematics teacher education. In addition, this identity lens emphasizes the resources, including other individuals and interactions, that contribute to or delimit the participants' identities. The next chapter will discuss the methodology behind the study beginning with defining narrative inquiry as the research approach.

Chapter 3

METHODOLOGY

This qualitative study examined the personal narratives and experiences of PSTs who self-identified as minoritized individuals. In particular, this study explored the experiences that led PSTs to pursue teaching in secondary mathematics in a moderate sized city located in the Southeastern United States. In addition, the study considered how the participants' identities as minoritized individuals affected their choices to teach mathematics. Likewise, the study inquired how PSTs' TEP aided or hindered their pursuit for licensure. Finally, the study identified what factors PSTs believed would be the most important in retaining secondary mathematics teachers for the long term. This chapter explains the methodology for this research by first providing a justification for my choice of narrative inquiry. A discussion of participant selection, data collection, data analysis, dissemination plan, limitations, and delimitations will follow.

Narrative Inquiry

Clandinin and Connelly (2000) refined the narrative research approach to a narrative inquiry methodology that commences and concludes "in the midst of living and telling, reliving and retelling, the stories of the experiences that made up people's lives, both individual and social" (p. 20). Narrative inquiry is mutual as the researcher and the participants "reach a joint intersubjective understanding of the narratives that occur during the research process" (Moen, 2006). The cooperative association between participants and researcher is also expressed in the re-storying of their experiences. Human beings give meaning to experience by situating it in time, place, and relationship to others (Connelly & Clandinin, 2006).

Re-storying offers an overall narrative structure to the stories of participants in order to reveal what, if any, experiences shaped them to pursue mathematics education. Re-storying must

be done conjointly with participants to ensure their stories are obtained accurately. In addition, new meanings can come from the experience of re-storying their stories, as they see them situated again in a larger context of the stories of others who shared the experience of being a minoritized individual pursuing mathematics education. Using Clandinin and Connelly's (2000) refined narrative approach, I re-storied the participants' experiences, seeking those moments or "turning points" that signal an impact on how participants "go about their lives" through individual and focus group interviews (Creswell, 2006). Narrative inquiry methods have been used in past educational research to shed light on early career teacher attrition (Schaefer et al., 2014) and how to use the method as a social justice practice (Caine et al., 2018; Seiki et al., 2018). In addition, narrative inquiry has been implemented in investigations in becoming a mathematics teacher (Kaasila, 2007), fostering identity in mathematics teacher education (Smith, 2006), and self-studies on racialized narratives (Milner, 2010). That said, I have not found a study using narrative inquiry to explore recruitment and retention of minoritized PSTs pursuing mathematics. The next section will outline how participants were selected to participate in the study.

Participant Selection

The focus of this qualitative study revolved around personal narratives of PSTs whose decisions to pursue secondary mathematics education as a career was impacted by their identities as a minoritized individuals amongst other holistic reasons. The participants were just starting their undergraduate career, about to graduate, transferring from community colleges, and/or returning to pursue a new career in teaching. With the lack of potential minoritized teachers in the Southeastern United States, the study sought five to ten voluntary participants. The goal to have at least 5 participants was due to the fact that there is multiple racially minoritized groups

such as Black, Latinx, Asian, and multi-cultural that need to have a voice in this study. The rationale to limit participants to 10 is due to the fact that there is a lack of minoritized PSTs pursuing mathematics education in this region with whom I have direct contact as an instructor or facilitator within their TEP or another context. After the recruitment of participants, the study landed on seven diverse participants. After the initial round of one-on-one interviews, I conducted a purposeful sampling of the participants that were available in order to maximize variation of participants in the focus group interview to provide differing narratives from PSTs who identify as minoritized individuals (Creswell, 2007; Patton, 2002).

It is important to mention that I have worked with all participants in some aspect of their teacher educator program or within STEM teaching internships. This is imperative when the researcher and participants are co-constructing their narratives. A personal and professional relationship, including shared experiences in the teacher educator program/STEM teaching internships and generally as minoritized individuals seeking mathematics educator certification, only strengthened the co-constructed narratives.

The rationale for examining minoritized PSTs in secondary education was that the grade range of sixth to twelfth tend to be more subject specific (e.g., mathematics, science, etc.) and focused more on mathematics instruction compared to elementary education (K-5) where teachers typically teach multiple subjects. In some school districts, upper elementary teachers do specialize in one or two subjects, but my intention to narrow the scope to secondary teachers was grounded in my experience in teaching mathematics in secondary schools. To maximize the experience as a co-constructor of my participants' narratives, I was compelled to research participants with a similar experience to myself within secondary schools rather than elementary schools.

It was my expectation to gather enough participants from connections through the East Tennessee STEM Hub to select five to ten participants for this dissertation study. The East Tennessee STEM Hub is an organization hosted by the Center for Enhancing Education in Mathematics and Sciences (CEEMS) that works with stakeholders in STEM education ranging from PSTs, in-service teachers, administrators, STEM teaching internships, STEM coordinators, and professors in education (including mathematics) to name a few. The organization provides professional development and networking for in-service teachers in addition of the creation and facilitation of Family STEM nights where students, teachers, and parents participate in hands-on STEM activities that promote interests in STEM. I sent an email to current and past participants that were identified as teachers of color, and all participants who agreed to participate were asked to participate in an initial individual interview.

The narratives and experiences from the seven participants provided enough insight into a range of stories of different PSTs from multiple races and ethnicities. Although the study grouped all minoritized preservice teachers together as a whole, it was interesting to find the similarities and differences among different races and ethnicities. The criteria for selecting interview participants involved whether they had formally pursued mathematics teacher education by taking at least one course at the collegiate level and whether they self-identified as minoritized. In order to increase variation and diversity among the participants, I hoped to obtain representations of the following: (1) a preservice teacher in the early stages of mathematics teacher education, (2) a preservice teacher in the late stages of mathematics teacher education, (3) participants ranging in gender, and (4) participants ranging in races from multi-racial, Asian, Black, and Latinx. I would have also liked to include American Indians, Alaskan Natives, and participants from the Middle East, but I did not have access to those individuals. On the next two

pages, you will see Figure 1 which indicates the funneling of selecting participants to select for the focus group. Figure 2 is a list of all participants and their demographics. Each figure helps visualize the selection process and describes the participants.

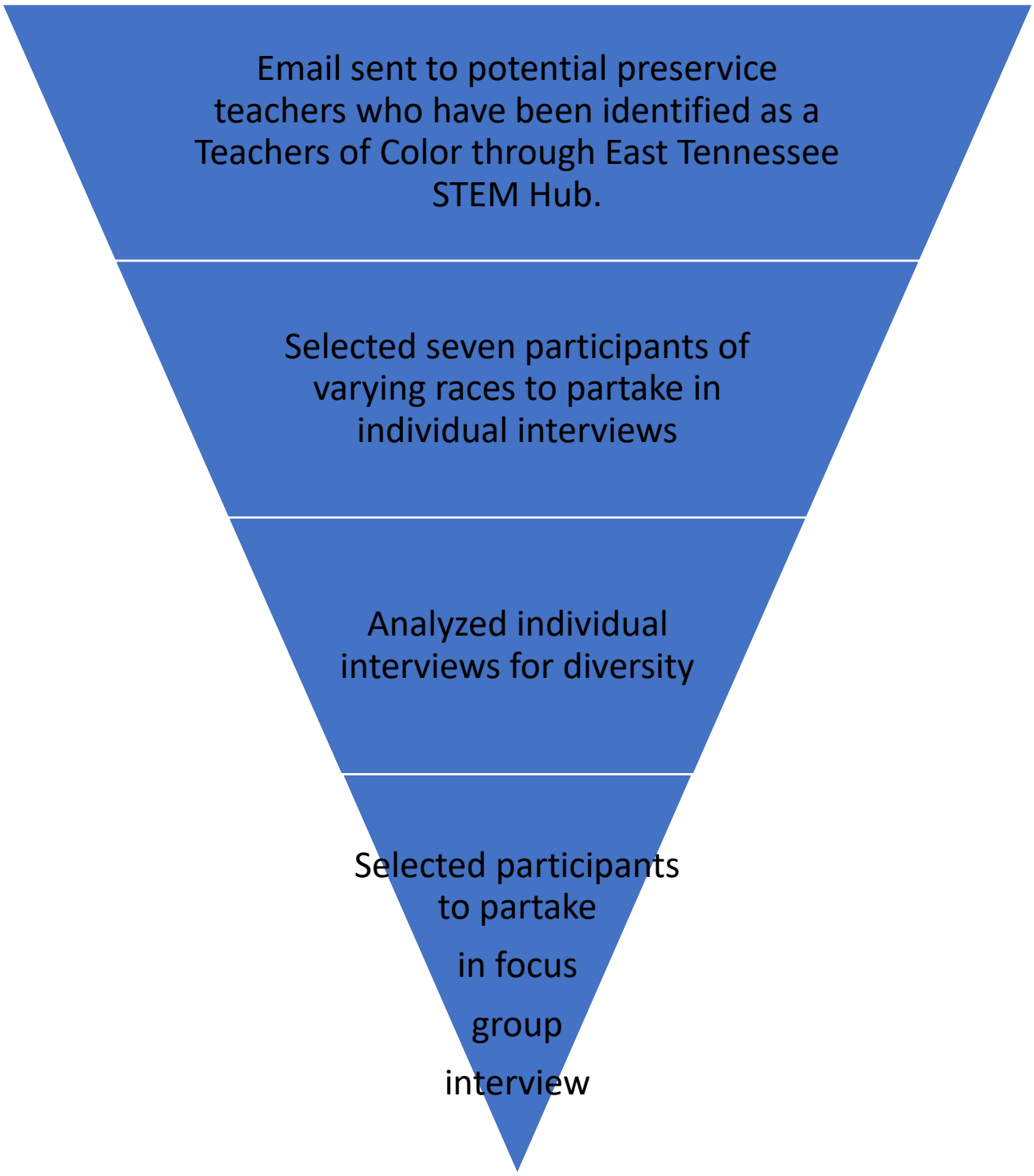

Figure 1. Participant selection criteria

Participants (Pseudonyms)	Demographics
Sydney	• Self-identified as African American • Female • U.S. Born • Mid-stage PST • Southeastern United States
Chu	• Self-identified as Chinese • Female • Born in China • Certified teacher that has not started working due to the pandemic • Southeastern United States
Gabriel	• Self-identified as Latinx • Male • Born in Mexico • Early-stage PST • Southeastern United States
Bethany	• Self-identified as Mixed-race with Japanese and White • Female • Born in Japan • Mid-Stage PST • Southeastern United States
Tiana	• Self-identified as African American • Female • U.S. Born • Early-stage PST • Southeastern United States
Peter	• Self-identified as African American • Male • U.S. Born • Early-stage PST • Southeastern United States
Il-seong	• Self-identified as Korean American • Male • Born in South Korea • Late-stage PST • Southeastern United States

Figure 2. Participant descriptions

Data Collection

The subsequent section is a chronological description of the data collection procedures which was implemented in this study, including: access and entry procedures, narrative individual interviews, a focus group interview, and usage of a research journal. Documents used for participant data collection can be viewed in the Appendix (Appendix A- Informed Consent Form, Appendix B- Informed Consent Form for the focus group, Appendix C- Individual Interview Guide and Script, Appendix D- Focus Group Interview Guide and Script).

Narrative Individual Interviews

The narrative interviews from all the participants served as the primary data source for this study. The interview process loosely followed Hermanns' three situation narrative format (1995): the first being in the context of "how did you start" becoming interested in mathematics teacher education; the second being "how things developed" into your pursuit to find the appropriate preservice teacher education program; and the third and final being "what became" of your journey to become certified to teach mathematics education in public secondary schools. This open-ended format allowed participants to share their personal narratives and experiences that impacted their pursuit to become a mathematics teacher in a reflective storytelling fashion. In addition, a structured interview guide (Appendix C) was used to steer participants towards sharing more detailed accounts of their experiences (Hatch, 2002; Hermanns, 1995; Rosenthal, 1993).

These narrative interviews provided a holistic image of each participants' narratives that influenced the decision to pursue mathematics teacher education as a minoritized individual. Narrative interviews allow for a more comprehensive understanding of the important relationships and factors that impact one's decision to follow a certain career path that may not

be commonly taken in today's society. Pre-determined questions (Appendix C) are only starter questions designed to initiate a deeper conversation with the participants relating to how they chose to pursue mathematics teacher education. I formed my follow up questions organically based on the narratives provided by the participants. Because of the nature of the study, follow up questions clarified participants' experiences. The structured interview provided participants and the researcher an opportunity to co-construct their narratives together. Each of these interviews lasted between 45-120 minutes in length, and video and audio were recorded through Zoom Video Conferencing and transcribed for analysis. In addition, informed consent forms (Appendix A) were utilized to ensure consent and confidentiality of participants.

Focus Group Interview

The focus group interview served as another data source for this research. After the initial round of in vivo coding, participants were selected to discuss similarities between different races in a focus group format. Participants were selected based on their demographics to promote diversity within the focus group and their availability to participate. The purpose of having them together was to draw upon respondents' attitudes, feelings, beliefs, experiences, and reactions in a way in which would not be feasible in their individual interviews. The participants bounced ideas off of each other and heard each other's experiences to uncover similarities and differences that could not have been accomplished in their individual interview. This provided insight into a more generalizable conclusion amongst minoritized PSTs in the southeastern portion of the United States.

Similar to the individual interviews, the researcher and participants co-constructed their narratives together through a semi-structured interview (Appendix D). The focus group interview allowed participants to add details to their individual narrative that had been left out because they

were forgotten or not mentioned. In addition, listening to other participant responses elicited responses which would not otherwise come from individual interviews. Furthermore, the findings from the focus group informed how to support a class of PSTs in delving into issues of race in classroom discussions. This was important as we want to support our PSTs' abilities to tackle inequities and issues of race that has been historically difficult to discuss in secondary classrooms due to a lack of instruction and support from teacher preparation programs. This interview lasted about 75 minutes in length, and video and audio were recorded through the Zoom Video Conferencing and transcribed for analysis.

Research Journal

A reflective research journal served as a medium to visually record my experiences, opinions, thoughts, and feelings throughout the data collection process (Ortlipp, 2008). The effect of keeping and using a reflective journal aided in achieving methodological rigor as well as encouraged critical self-reflection on the whole research process from selecting participants to analyzing data. Boden et al. (2005) commented on the challenges of inexperienced researchers to sift through the "muddle, confusion, mistakes, obstacles, and errors" (p. 70) that are part of the qualitative research process. "Keeping and using reflective research journals can make the messiness of the research process visible to the researcher who can then make it visible for those who read the research and thus avoid producing, reproducing, and circulating the discourse of research as a neat and linear process" (Ortlipp, 2008, p. 704). A snapshot of the research journal can be seen in Appendix F. The next section will examine the data analysis process.

Data Analysis

During this study, preliminary and primary data analysis occurred concerning both the individual narrative interviews as well as the focus group interview. Preliminary data analysis

during both interview types assisted in providing structure and quality-checking of participant responses. In addition, this process provided an opportunity to start initial analysis for possible implications and overall recurrent themes. The researcher continued to use the research journal during this preliminary analysis process to keep note of themes, irregularities, and noteworthy findings. Patterns and findings from the preliminary analysis portion of the individual narrative interviews influenced modifications in the questions and process of conducting the focus group interview. The analysis of the data collected in the research journal was then transferred to a spreadsheet with each individual participant's quotes and initial codes. This was the beginning process of the primary data analysis.

Primary data analysis of the transcriptions from the audio from both interviews served as the primary source of data in this study. In addition, video recordings of the Zoom Video Conferencing interviews allowed the researcher to focus not only on the words chosen by the participant but also their body language, facial expressions, changes in tone, and verbal emphases while answering personal questions about their experiences. The experiences and narratives collected were then coded *in vivo* through continuous coding cycles with constant comparisons (Saldaña, 2013). In the opening round of coding, each individual interview was evaluated separately through multiple readings of the transcript while examining the notes on body language and facial expressions to be for significant findings to address the research questions. These codes were created from concrete experiences contributing to participants' journey to become a minoritized mathematics teacher and recorded in the spreadsheets mentioned above. The final spreadsheet with all possible individual narrative themes is located in Appendix G.

The next portion of analysis examined experiences from all the interviews to be classified into different domains that defined significant themes that have been found to impact a minoritized individual pursuing mathematics teacher education. The main domains found from the classifications from the spreadsheet were then analyzed into axial codes identifying relationships from the open codes (Saldaña, 2013). These emergent themes provided an opportunity to examine the irregularities amongst the data as well as similarities that were identified as resonant narrative threads. The figure on the next page provides a snapshot example of coding phases that organically contributed to the theme of identity. In addition, Appendix H provides a list of some of the possible resonant narrative threads identified from the individual narratives.

Validity and credibility were important to maintain during the data analysis portion of this study. To address validity and credibility during the coding process, member checks were performed with interview participants from both individual and focus group settings regarding the accuracy of the transcriptions as well as body language and facial expressions analysis. Member checking ensured personal narratives were accurate even though the participants and I co-constructed the narrative through the interview process. After providing analysis to participants, their feedback and attention to accuracy were reconsidered for further analysis (Creswell, 2007). The only feedback the participants asked to modify was the usage of filler words in their quotes such as “like” or “um”. All seven participants expressed the high accuracy of their narratives in comparison to their real-life events. After the figure of the coding phases, the following page is a chart with all the research questions as well as the data source and method of analysis.

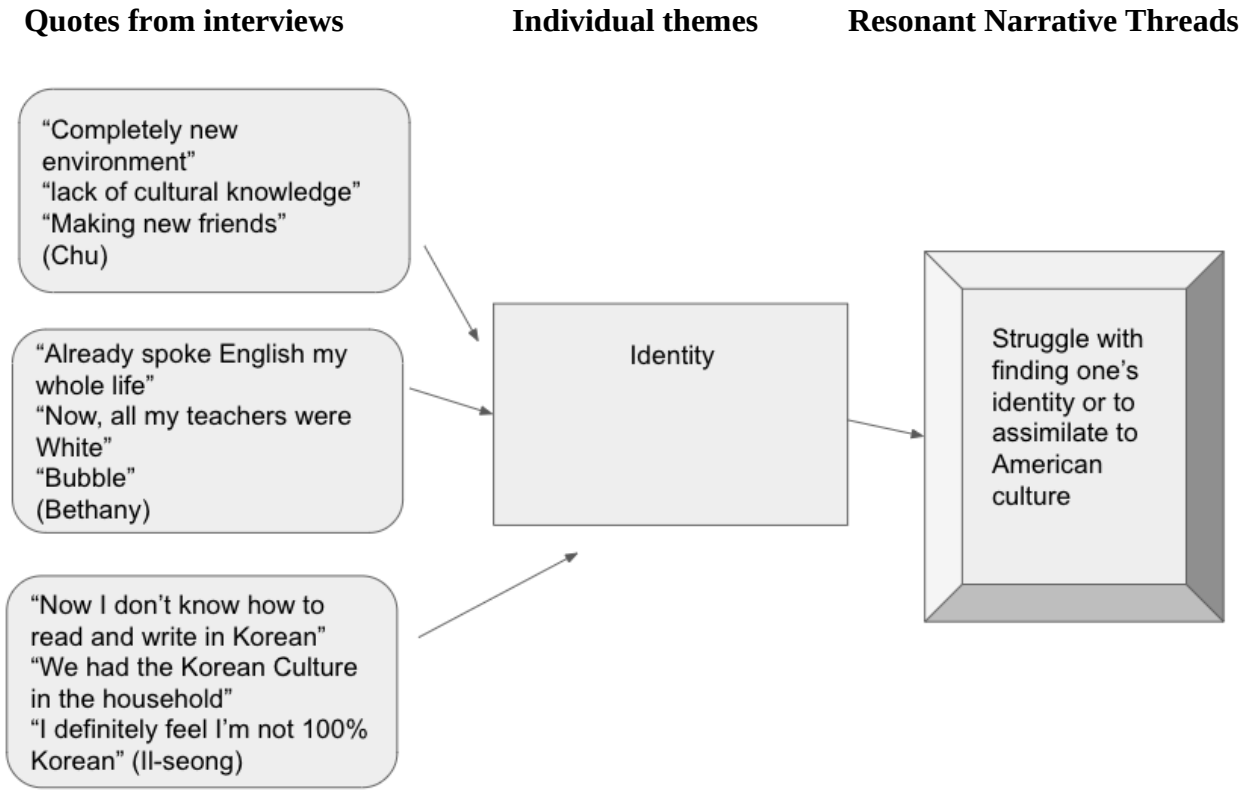

Figure 3. Snapshot example of coding phases using identity.

Research Questions	Data Source	Data Analysis
How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education? • Does an identity as a minoritized individual affect one's pursuit of mathematics education? • How has the teacher educator program aided or hindered one' pursuit to become a mathematics educator? • What are the similarities and differences in experiences between different races and ethnicities that are pursuing mathematics teacher education?	Individual interview Focus group interview Research Journal	Transcribed interviews Pattern Coding In Vivo Coding (Using the participants own language) Axial Coding Member checking of data analysis
What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs? • What are barriers for minoritized preservice mathematics teachers to remain in teacher educator programs? • What do you believe are the most important factors for minorized mathematics teachers to continue teaching mathematics for a long career (over 10 years)?	Individual interview Focus group interview Research Journal	Transcribed interviews Pattern Coding In Vivo Coding (Using the participants own language) Axial Coding Member checking of data analysis

Figure 4. Research Questions with Data Source and Analysis

Methodological Issues

The following section describes issues related to my methodological choices. With all types of research, there are always strengths and challenges for selecting a particular method. The main objective is to reduce the challenges while issuing sufficient justification for the choices made along the way. In the next sections, I explain the limitations and delimitations I have placed in order to increase the validity of my study.

Limitations

The narrative interviews were used in this research study with a noteworthy conjecture that the accounts of which the participants tell were truthful experiences, describing a series of events, actions, and relationships that have taken place during the pursuit of becoming a mathematics teacher. The study therefore progressed with this conjecture that the memories from participants were perceived by them as actuality as they underwent these happenings. With this conjecture, a possible concern was that the process of highlighting certain experiences during interviews encouraged particular comments from participants, suggesting divergence from what may have been the "true" experience (Hermanns, 1995; Lincoln & Guba, 1985; Polkinghorne, 2007; Rosenthal, 1993). However, this situation exists with any study that includes interviewing as the central method of data collections. The length of the interview and the questions focusing on individual and educational experiences supported participants in providing comments that reflected their thoughts concerning what they experienced. In addition, the organization of this study attended to the prospective divergence during a fully open narrative interview and brought in structured interview questions that facilitated leading participants to broaden their explanations and specify their experiences in their storytelling (Appendices C and D).

The pre-selected number of participants provided a deep understanding of each participant's experiences in becoming a certified, minoritized mathematics teacher. Although the participants only represent a small portion of the experiences minoritized teachers that pursue mathematics teacher education, their detailed accounts of their holistic journey provided for a deeper connection that cannot be identified through other research methods such as generic surveys and other quantitative methods.

Additional researchers' examination of a portion of the data strengthened the reliability of the data analysis. The two additional researchers did not have access to any confidential or identifiable information from the participants. Only a portion of interviews with the use of pseudonyms was available for analysis. The two additional researchers analyzed a voice recording of one interview and coded for themes related to the research questions. This process confirmed that the findings were reflective of the actual data set.

Delimitations

The primary purpose of this study was to provide insight into the narratives of self-identified minoritized mathematics PSTs and how they decided to become educators so that stakeholders can decide how to pursue diversifying their teacher cohorts. I chose not to focus on science teachers in addition to mathematics teachers even though there have been calls for more STEM teachers in general as well (Guarino et al., 2006). Although I believe minoritized science teachers could have similar experiences as minoritized mathematics teachers, my choice to limit the focus on mathematics was motivated by my personal experience as a former minoritized mathematics secondary education teacher. Because narrative inquiry relies on transference, it is up to the reader to decide if this study applies to their discipline.

In addition, the term “minoritized” could be defined in many different ways from socioeconomic status to gender to sexuality and beyond. My choice to use the term as one who identifies as a person from a historically underserved community based on race or ethnicity does not devalue other aforementioned factors (i.e., socioeconomic status, gender, or sexual orientation). My study was built off of Lipman (2004) who discussed the “equitable distribution of material and human resources, intellectually challenging curricula, educational experiences that build on students’ cultures, languages, home experiences, and identities; and pedagogies that prepare students to engage in critical thought and democratic participation in society” (p. 3). In addition, Gutiérrez (2001) argued that in an equitable world, one should not be able to predict certain outcomes solely from examining students’ race, class, gender, or another characteristic. My focus will be on race and ethnicity for this study.

Summary

This qualitative study examined minoritized preservice teachers’ narrative stories on their experiences in pursuing mathematics education for teaching in secondary schools. Through these remembrances, the researcher identified aspects of these experiences that contributed to their success or lack of success in becoming a certified mathematics teacher. The researcher found proactive measures to recruit and retain minoritized mathematics teachers that stakeholders can then use to diversify their staff. This study took place in a moderate sized city located in the Southeastern United States. Seven participants were selected to participate in the individual narrative interviews. In addition, three participants were selected for the focus group based on their individual interviews and their availability. These interviews were analyzed exhaustively for further interpretation and deep understanding of each participant’s narratives as a minoritized pursuing mathematics teacher education.

Chapter 4

INSIGHTS GAINED

The analysis for this study focused on two major research questions: (a) how do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?; and (b) what reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs? Chapter 4 provides insight gained in relation to these questions as well as the sub-questions according to seven preservice mathematics teacher co-constructed interviews. Descriptions for each participant are products of the responses of the one-on-one interview questions (Appendix C) as well as focus group interview questions (Appendix D). The one-on-one interviews, given the guiding questions, followed a particular structure. First, participants identified themselves as specific minoritized individuals and spoke to their general life experiences. Second, participants expounded upon their educational experiences with parents, teachers, and peers. Third, participants enlightened us with their decisions to pursue mathematics education as a career. Fourth, participants spoke about their experiences with their TEPs. Lastly, participants anticipated what factors would be important to them to be retained as a mathematics teacher.

In this chapter, the first section will present each of the seven participants' individual narratives with their specific themes. Examples of themes vary from intersections with race, becoming/being a teacher, critical individuals, opportunities based on race, and identity. Then the chapter will shift to the resonant narrative themes discovered through the comparison of each individual narrative. The main resonant narrative themes are minoritized identity, critical individuals, supporters and resistors, aha moments, TEP, learning and barriers, and PSTs' retention factors.

Individual Narratives

Participant #1- Sydney

Sydney was a current preservice mathematics teacher who self-identified as an African American minoritized female. I taught Sydney in high school as well as in her introduction to STEM education courses as part of the Teacher Education Program (TEP) at a four-year University. A number of themes emerged in Sydney's interview. These included intersections with race, critical individuals, support and resistance, and becoming/being a teacher with the emphasis on her individual voice.

Intersections with race. Even though she identified as African American, Sydney was not totally convinced that African American was the best way to describe her heritage. She identified with the term African American so she could be placed into a category that others were familiar with based on her appearance. Reflecting this idea, Sydney stated, "And I don't know, because I don't really identify with African-American. I'm not African. I guess I am back in history, but then half of my mom is Mexican, so it's really weird. I don't know. I feel like I just categorized into something, because I don't really feel like that's really me."

Throughout her life, Sydney experienced racism covertly and overtly, as she noted in her interview. She remembered as a young student living in a rural, southeastern community in the United States dealing with peers who were "ignorant" in terms of race. She used the term ignorant because she did not believe her young peers were purposefully being racist, as she conveyed in the interview. For example, Sydney vividly recalls a White student telling her, "I don't really like black people, but you're nice." As a young student, Sydney accepted these events as normal and did not realize it was actually harmful until much older. Sydney said:

> Yeah, I look back on it and be like, oh. And I didn't realize that when in third grade. I didn't realize that was something mean, but when I think about it, it took me years to realize because I didn't even think about that statement for a long time. It took me years to realize that it wasn't nice.

Even though she did not recognize these events as racism at the time they occurred, she felt stuck because she did not think addressing it now would help make changes but rather would cause more issues. This is evident in the following excerpt.

> Not that I don't care, but I feel like it's at a point where it's, me myself, I'm not going [to] be able to fix it. I can sit there and argue with you all day about why that's wrong, and how you shouldn't be that way, and things like that, but it's not... Sometimes I feel like it's arguing with like a brick wall, you're not going to change their opinion, if anything, I can worsen their opinion.

At the beginning of her high school career, she still resided in the rural community and still saw racism at her school. She mentioned a memory of seeing "white power" spray painted onto the school walls. The racist comments were addressed by the administration but were not completely erased. The words were still visible in fact. Sydney was very careful in this rural setting as she felt like she was "representing of all the Black people." She felt pressure to do well in school and to contradict any stereotypes placed on people who look like her. As she describes:

> I just try to portray myself in a better format because sometimes also I'm representing... A lot of times when I was at that rural high school, I would feel like I was representing all of the Black people, I guess you could say, rather than just myself, so I would try to portray myself in a better manner so that they wouldn't have a bad image.

The theme of race was evident in Sydney's interview comments through how she self-identified and her experiences with racism. Although Sydney did not consider race to be a major factor growing up, as she reflected through our conversations, it forced her to recall past events; she understood that race was more of a major factor than she considered previously. She accepted her life events as the norm previously but began to ponder on that assumption during the interview.

Critical individuals: support and resistance. Another theme that was identified in Sydney's interview was that of critical individuals who were part of her story of being a teacher. These critical individuals first contributed to her valuing education but then resisted continuing education and her thoughts about teaching mathematics. For example, Sydney's family encouraged her to do well in school even though her father did not pursue post-secondary education while her mother returned to education only after Sydney had started her post-secondary career. On the other hand, Sydney's grandparents pursued post-secondary education. Sydney described how her peer groups both in high school and presently have had mixed influences on her. Her studious friends definitely encouraged her to do well in school, but not all of her peers valued education. Sydney was often caught in between both groups and eventually decided to value education and pursue post-secondary opportunities while still keeping some contact with all her friends.

Other critical individuals in her educational experiences included teachers. Sydney noted her experiences with teachers as a Black student, conveying that she felt like all her teachers viewed her like any other student rather than only as a Black student. She never felt she was treated differently due to her minoritized status. This was conveyed through the following excerpt.

> I was just a student. It wasn't like, Oh, she's an African American student, or anything like that. I was just a student, so I can't really think of anything specifically. If anything, my teachers were like, Sydney, if you applied yourself, you'd be really smart or something like that.

Sydney had very few minoritized teachers in her educational experience. She remembered two African American teachers during her primary schooling. One was not her teacher, but she still had fond memories of her. The other teacher and Sydney did not get along well. To this day, she is unsure why there was not a good relationship between the two. As Sydney moved from the rural school to a more urban school, she only remembered having a couple of minoritized teachers. One of which was me, and the other was a substitute teacher.

Moving specifically to teacher education, Sydney described the impact of one teacher in particular. Sydney noted an aha moment when she decided to pursue education as a career after her senior year of high school. In this moment, her mathematics teacher encouraged her to pursue mathematics by telling her that she had high potential but that she was not trying hard enough and underachieving as a result. This comment sparked Sydney's interest in a mathematics major, but she was confused about what she would do with mathematics. She believed most mathematics jobs would be boring and dull until she thought about and became interested in teaching. As she noted about her thinking at that time, "I can be a teacher, because I really enjoyed working with kids, and then I would want them to feel the same way that I feel about math." In addition to interactions with her high school mathematics teacher, Sydney's experiences working with local recreation centers further impacted her decision to pursue mathematics education as a career. In this way, the children and young adults with whom she

worked at the recreation centers were critical to her story of becoming a teacher. This idea is reflected in the comments below.

> A lot of the kids that come here, they're minoritized kids, and working with them it made me kind of realize that's kind of the demographic I would like to work in an area where there's a lot of minoritized kids. Just because I would want them to see someone that looks like them, doing a regular job, you don't have to do all of this [other stuff] you can do something else other than what you think you're doing, or what do you think you have to do? I would love to be a role model to my future students.

Sydney did not always have support in her decision to pursue mathematics teacher education, particularly from her family. Her family offered alternative thoughts to becoming a teacher and encouraged her to find more lucrative careers for the purpose of financial stability. This made her second guess her decision, but it also gave her an opportunity to confirm it. She finally came to the conclusion to pursue mathematics education as a career. The comments below reflect this idea.

> My grandparents, they were like, Sydney, if you're going to school for math, don't be a teacher. And they kind of skewed my viewpoint a bit. And I was like, should I do something else? Because they made me feel like I was settling... They were like, you're smart, so why are you going to pursue a math degree, then just going settle on being a teacher? And I was like, I guess, yeah, you're right. I mean, why am I just going to settle on being a teacher, but then I realized that I wasn't settling on being a teacher. They wanted me to go and work and get money, which is fine. Money is great, don't get me wrong, but I was like, I was not going to be happy with that. Man, of course, I'd be

> happy, but was I going to be genuinely happy? And I realized I wasn't going to be genuinely happy with that, so I went back to teaching.

Although Sydney was met with resistance, she eventually decided what would be best for her and did not worry about what others perceived as best. Therefore, Sydney decided to further pursue her interests in becoming a mathematics teacher.

Becoming/being a teacher. Another theme that was identified in Sydney's comments was that of her experienced as a minoritized students in becoming a teacher. Sydney attended community college and then a four-year university in the Southeastern United States similar to where she grew up. She has had a positive experience with her teacher educator program. She liked the fact that there are a lot of classroom experiences and opportunities. She liked one-on-one time with colleagues, teachers, mentor teachers, and professors. Sydney is often one of a few minoritized individuals in her university as well as TEP, and because of this she did not like to speak up in class about minoritized issues because she did not want to be the token Black student. She did offer her opinion when asked specifically, but during those moments, she emphasized that her comments only offered her personal experience and did not speak for others -- namely other Black students.

The idea of voice appears again in relation to comments about being a minoritized teacher. Sydney did not think her TEP has prepared her to be a minoritized teacher but rather a general teacher. Sydney stressed that while the TEP spends considerable time about how to work with minoritized students, it does not spend time on what it is like to be a minoritized teacher. She attributes this to not having enough minoritized PSTs in the program. She describes:

> No. So we don't really discuss it. So, we talk a lot about having minoritized children in our classroom and accept children from all types of backgrounds and things like that, and

> that part... I think they do as good as they can with that part, because a part of that is there are certain people that I feel like probably shouldn't be a teacher... And it's not because they're bad people or anything like that. It's just because they're so stuck in their viewpoint that they're going to have bias. They're going to be biased and not in a good bias way, it's not going affect the children in a good way, so they tell us how to go about that part, kind of, in a sense, but we've never really talked about what it would be like to be like a minoritized teacher or anything like that. And it may be because there's not many minorities. It might be because there's not many minorities in my teacher educator program.

In addition to this observation about minoritized preservice teachers, Sydney noted that she wished that her TEP would provide more classroom experiences in order to provide experiences with multiple types of students and schools in order to solidify whether she wanted to be a teacher or what type of school would be the best fit for her. In a sense, the experiences seemed to have potential in contributing to her perspective and developing voice. As she comments:

> I feel like just honestly, just more experience in the classroom. Yeah, definitely more experiences in the classroom, just because, I know I want to be a teacher and things like that. But I feel like even for other students, it would be better for them to have more experience in the classroom, that way they can really see if that's something that they want to do. In our TEP, it's a lot of group discussion, and you're bouncing your ideas off of each other, and I feel like as a teacher, you have to be open-minded person, you can't be a very close-minded person because you're going have students from all types of different backgrounds, all types of different situations and things like that, so if you're

> close-minded, you're not going to fully understand that student or accept that student, and as a teacher, your job is, of course to educate and teach, but you're also there your students are at school half of their day, so you're a very influential person to students.

Sydney wanted more classroom experiences so she could experience more varieties of situations with all types of surroundings and students. But she also wanted more classroom experiences so other PSTs could interact more in those experiences in which they may have never faced previously. She stated above, a teacher cannot be close-minded but rather needs to be open-minded. In addition to being open-minded, the actual experience of dealing with or watching mentor teachers deal with diverse situations could be invaluable. These above comments also confirm the importance of being inclusive and supporting all of the different students in a classroom.

The theme of voice appears again in Sydney's comments regarding barriers to her finishing the TEP as well as continuing her career as a minoritized teacher. The comments below reflect the barrier of mathematics content and conclude with a point about voice.

> So, I totally feel like it could be a barrier, but not just for minorities, like for everybody, because math is hard. I'm going to do good this semester, but next semester I'm really worried about it. So, if I don't finish next semester, I'll have to do another. I don't know what I'm going to do because the next semester is all in my math courses... If I finish all my courses next semester, I'll end with student teaching. So, I'm like... I don't know, I feel like to be a high school math teacher, [but] I don't really feel like the level of math that I'm necessarily taking at this point is necessary. But...I don't really understand the... I'm taking this level of math, but it's fine, I mean, I'm not like... like I said, this semester is good. Next semester, not so much, but yeah. So, I mean, that in itself is just a barrier,

> just because the degree itself is so hard. Then it brings you back to what if I'm getting a degree in math, and why am I going to sit here and go be a teacher that probably doesn't get paid very much, and then [my] voice might not get heard...

Sydney continues to reiterate the importance of her voice being heard and whether teaching mathematics would be worth it to her if she is not getting paid comparatively to non-teachers with a mathematics degree. During her career, she feared another barrier would be that parents of her future students would question her credibility to teach mathematics. As she notes:

> Maybe with parents, especially because I'm a female math teacher, and then I'm African American. So, I can see with certain parents, it being an issue. I don't feel like it would be an issue with any of my peers or anything like that, but I don't know for sure.

The quote above confirms how Sydney is considering how others might view her as a teacher, acknowledging other social identities that come into play. This acknowledgement reflects an awareness and an anticipation of the issue.

Voice appears again in Sydney's comments related to retention in mathematics teaching. She stated the most common issue is increasing teacher pay but understood that the issue is very complicated and something she has not researched thoroughly enough. She emphasized the value of her voice being heard. As a classroom teacher, she will be the one in the classroom and wants to be trusted as the professional guiding students, not detracting from their learning.

> I don't know, I assume. I genuinely don't know. I talk, I hear a lot of people talk about pay, but I'm not really big on pay. I guess I will be once I start teaching, because I really don't know how much you get paid as a teacher and things like that, especially in my city. But maybe really just allowing me to be heard as a teacher, so I can put up with a lot of stuff, but I'm the one who's actually in the classroom. I'm actually teaching the students.

> I'm like, you know, I really think that this should happen, or this isn't working, or something like that, then I feel like that would really affect me either wanting to stay at that school if my voice isn't being heard or wanting to stay even in that field if my voice isn't heard. Because if I'm speaking up on something, it has to be like a big deal, it's not like a small matter.

Sydney's concern with her voice being heard seems to resonate throughout her interview from her experience in her TEP to concerns about the administration or other veteran teachers' support. She really believed that her support group of peers, teachers, mentors, and supervisor from her TEP really listened to her and appreciated what she brought to the program. As mentioned previously, Sydney was often the only Black student in her classes, and she didn't like to speak up in class about minoritized issues because she does not want to be the token Black student. But when she offered her opinion when asked, she emphasized that this is only her experience and does not speak for others, especially, other Black students. It is interesting to note that she craved her voice being heard as a teacher but resisted giving her voice about being an minoritized individual in her TEP.

Summary. Sydney's themes were significantly impacted by her minoritized status and life experiences. First, her journey to pursue mathematics teacher education from the first time she considered becoming a teacher was heavily influenced from a teacher's comment about her mathematical ability. Second, her battle with her family's initial lack of support to become a teacher due to the lack of teacher financial wealth coupled with her experiences working with minoritized students at a local recreational center influenced her questioning of her choices. The next themes focused on her TEP and becoming a teacher. There was a major focus on the TEP as preparing general teachers and not minoritized teachers to the extent there was a lack of diversity

present in the four-year university and TEP. The final theme revealed what Sydney determined as her most important teacher retention factors, which included her voice being valued and heard.

Participant #2- Chu

Chu was a teacher who had earned teacher certification but had not yet started teaching due to the Coronavirus. I worked with Chu throughout her TEP and also served as her main supervisor during her internship. She identified as Chinese since she immigrated to the United States when she was 15 years old without being able to speak any English. A number of themes emerged in Chu's interview. These included assimilating to the American culture and finding her identity, critical individuals, and becoming/being a teacher with the emphasis on student success.

Assimilation or identity processes. Chu moved to the United States in the middle of her teenage years and initially had a difficult time learning the new language as well as learning the new culture. She had a difficult time in school, academically and socially, due to her language barrier. She believed her peers and teachers were very supportive of her success and did the best they could with their resources. When Chu moved to the United States, her family settled in a very White dominant neighborhood in the Northeast United States. The first theme identified through her interview was her pursuit to assimilate to the American culture as quickly as possible to make sure she could succeed academically and socially.

Chu's parents, as she stated, were the stereotypical strict, immigrant, Asian parents who demanded high expectations without being able to assist due to their language barrier. She received a lot of pressure from her parents to succeed, but Chu believed she also put as much pressure on herself to learn the language and assimilate to the American culture. On the other hand, Chu commented that her peer groups really facilitated the transition into American culture. Her friends taught her how to hang out and watch movies like they did. Chu said:

> [They] gave me a warm feeling that I can fit into this place, once you have more sense of belonging, that gave me more motivation and learning. Also give you better school experience by having those friends to make you feel like you are not just a learner, so also you have [in] life... you have friends that you can help you learn about all different things that you cannot learn from school.

Chu recalled having one Asian American friend who would really "give [me] a lot [of] help, and we study together. And she explained a lot of things to me, so that makes my life more colorful". Chu looked up to her Asian American friend as a role model of what she could eventually become if she could speak English and relate to American culture. In other words, these comments convey ideas of assimilation to be more American or can be interpreted as her journey to re-invent her identity.

Critical individuals: Teachers. Another major theme that was identified in Chu's interview were critical contributors to her educational experience as well as her pursuit to become a teacher in the United States. Her first major ally was a White, female school counselor who acted as her student guardian when she first moved to her new school. The counselor would follow her throughout the day, making sure she had all the available resources and even attempted to introduce her to new friends. Chu also mentioned that teachers attempted to differentiate instruction for her by translating tests into her native language, but she believed it did not help because she learned everything in English in class and had no reference points to Chinese vocabulary.

It is worth mentioning that Chu did not see one minoritized teacher until her college experiences. She learned a lot from her minoritized teachers but referenced one African American education professor as a major contributor to her success.

> She resonated more with me as a minority student teacher, so she knows what we need to be successful and try to be on your side and help you to be successful. And more than just give you a lecture, like facts... but she also taught how to be more patient with students and knew how to get you more motivated.

This was the first time Chu realized she could make an impact on her future minoritized students. She could model what her minoritized education professor did for her to what she could do for her future students. Chu stated that her identity as a minoritized individual did not affect her decision to pursue education, but her experiences gave her an opportunity to see how her presence could make an impact on all of her students.

Becoming/being a teacher. The last theme that emerged from the interview was about aspects that have contributed to her becoming/being a teacher. Chu reflected on an individual event with peers that impacted her decision to make the transition from a pharmacy major to a mathematics major with a minor in education. She reflected back to her high school experience when she was assisting peers sitting around her desk and with her "broken English" was able to help her peers because mathematics is the "universal language", as she stated. She believed mathematics was a gateway for her to build more confidence in herself as well as leverage her ability and interest to help others.

Chu believed her TEP prepared her to be a great teacher. According to Chu, the TEP provided lots of diverse experiences at different school districts, schools, classrooms, as well as grade levels. She had an opportunity to experience diverse types of students from different social, political, and economic backgrounds. She believed her program took her step by step to achieve teacher certification. She mentioned standout professors who cared deeply about their students and who always checked in on their progress as well as their well-being. Although the

TEP prepared her to be a teacher, Chu believed that there was no emphasis on what it was like to be minoritized teacher due to the fact that there were not many minoritized students in the TEP. However, the TEP embraced the diverse methods Chu brought from her experiences living in China. The TEP professors and students encouraged Chu to always share her different viewpoints and methods not only in mathematics but also other disciplines and cultures. Her TEP wanted her to be able to teach her students with various methods, sometimes considered unconventional in the United States. Chu stated, "I have more of my own thoughts and my own ways of solving math problems since I have that time and education in China, so different math tricks I would like to teach my students." Chu believed student success was a major focus of her TEP.

One wish Chu expressed concerning her TEP was the fact that the faculty promoted the inclusion of culturally relevant and responsive perspectives in lessons developed and taught by PSTs, but the TEP did not necessarily provide concrete steps for how to do that. She saw value in relating culturally relevant education into her daily lessons but did not know how to implement it as she moved to the United States fairly late compared to her other participants who immigrated. Chu did not have any barriers to finishing the TEP but mentioned a concern about being a token teacher within a school and worrying whether she would fit into the teacher community. Interesting enough, she was not concerned about her students' perception of a minoritized teacher. Chu stated:

> At first, I will worry about being minoritized teacher, in teacher community, not student community, how you're going to get along with American teachers, because if you are the only one that is minoritized, that's one thing I am more concerned about because if you still not totally know their culture and how do you communicate with the white teachers.

Chu felt comfortable being a minoritized teacher for her students but was more concerned about how she would interact with her peers and co-workers. This brings into question whether her TEP is providing minoritized PSTs with as many tools as possible to combat the struggles for first year minoritized teachers.

Chu believed that teacher retention relied heavily on her students' success. She wanted her students to be grateful for the teaching methods and strategies she was providing for her students. However, she realized during her student teaching experience that she cannot only rely on student success because students and teachers together should be working to promote mathematical growth and not just success. As she stated in her interview:

> I think I did put too much pressure on this goal, because it is the first year, it's hard to be completely successful as a first-year teacher. So, I thought it would be very easy for me to have immediate student success... but when I did not... I thought I was not a good teacher. I think that was a hard time [for me], and I knew I had some ability to teach them, so like you told me you need balance between growth and success. Each year I will get more experience, and I hope not to focus so much on student success.

During and after Chu's internship experience, she questioned whether she was equipped to remain a minoritized mathematics teacher. Her students were not mastering the material to her high expectations. She considered quitting the profession. Luckily, with the support of her mentor teachers, supervisor, as well as TEP professors, Chu decided to stay in the profession when considering mathematical growth could be just as important as mathematical mastery of a standard. She also believed that extra support and professional development for new teachers would be beneficial. Her comments below reflect this idea.

> A second thing is giving extra supports and to have a great professional development program for new teachers that can match your teaching style. In order for you to be successful you must learn new things because in order for your students to be successful, just knowing your content is not enough, you must know your students much more in-depth. And when you do learn about your students, you will have the great strategies to teach them.

Through her experience in the internship, Chu realized how important mentoring could be for first year teachers. Mentoring is crucial for new teachers, but Chu brings up a major point that any mentor will not suffice. Administrators need to be intentional when selecting mentor teachers with new teachers. If administrators can match teaching styles of mentor and new teachers, mentoring can be more effective and meaningful.

Although Chu did not consider her identity as a minoritized individual as a factor in pursuing education, she now knows her story could be a motivator for all her students, as reflected in her comments. Of course, this can be true for other immigrants, but the story of an immigrant succeeding in America with major language and social barriers could influence all students, she noted. She believed her story of not knowing English yet still succeeding could provide all her students with hope that they could also grow and build confidence in mathematics as someone who could not speak the language persevered and succeeded. As she stated:

> I think that actually came to mind once, like helping students who like me didn't know English, like minoritized students who came to the US. Like an English as a second language (ESL) student not knowing the language, have a difficult time learning math... I had that experience, so I can resonate with them more and know the way to help them,

since I already had that before, but internally, the reason wants to be a teacher to help all students. Attend to equity and access to the resources they need.

Summary. Chu's themes from her interview were impacted by her Chinese immigrant status in the United States. First, a theme related to her drive to assimilate to the American culture to be able to quickly succeed in the educational system as well as within her social groups revealed itself in the interview. The pressure from her parents coupled with the support from individuals such as teachers, counselors, and peers aided her ability to assimilate to the American culture enough to fit in. Such critical experiences paired with the critical individuals throughout her life allowed her to pursue education. This was a second theme identified. The final theme from Chu's narrative was that of becoming/being a teacher. Chu honored the experiences and individuals who aided her own journey to becoming a certified teacher.

Participant #3- Gabriel

Gabriel was a current preservice teacher who identified with a Latinx identity. I met Gabriel during an introduction to STEM teaching internship I was facilitating. I have worked with Gabriel outside of that internship as well as during a second internship. We have become friends and occasionally hang out at the golf course. A number of themes emerged in Gabriel's interview. These included intersections with race, critical individuals: support and resistance, and becoming/being a teacher with the emphasis on Latinx/Black teachers' credibility.

Intersections with race. Gabriel was born in Mexico but moved to the United States at the age of four. His family initially lived in California but moved to the Southeastern United States. He has been there since age seven. Gabriel remembered being bullied at an early age in California as well as in his current city of residence. At an early age, he cannot remember why he was bullied, but as he got older, he attributed the bullying he experienced to his ethnic

background. As he described, bullying turned into racial slurs and comments crying out for him to go back to his country. Attacks on his race and ethnicity fueled his rage and resentment for being Latinx. He disassociated himself from his Latinx heritage in order to appease those who persecuted him for the way he looked. This eventually led to his feelings of superiority over those who looked similar to him but could not speak English. Although he was trying to be more like the crowd, he never felt included by his peers. He was not American enough, nor Latinx enough, as he noted. He was stuck in a self-described state of limbo. Later in his older teenage years, he started to search more into his background while also trying to embrace it more than he previously had. Unfortunately, at the same time, he found out about his undocumented status while trying to apply for colleges and finding out he was ineligible. His feelings of superiority were quickly dismantled by the news, and he experienced "a different perspective in life and made me more humble and maybe made me more open, like open minded to see, like, what others go through".

Critical individuals: Support and resistance. Gabriel was not a traditional college student. As mentioned before, he was denied access to post-secondary education until he was married and earned his green card. He started college at age 27 when he majored in accounting since he had experience working with financials for his family's car dealership. His parents always taught Gabriel hard work and independence as keys to survival. They did not necessarily stress education or higher education, but they were supportive of his decision to go back to school and his mother offered financial support. Gabriel attended schools with predominantly White students and teachers. He can only recall a handful of other Latinx students throughout his educational career. He remembers having only one Latinx friend. Gabriel considered himself a

“loner.” As he describes, he talks to everyone but is not included in any specific friend groups. He emphasized that he did not always have positive experiences in school.

Gabriel cannot recall having any academic teachers that were minoritized, although one White teacher made a lasting impression on him. He can remember his eighth-grade teacher recommending a below-standard mathematics class for him. He was not sure why he was recommended for such a low-level class when his grades were okay. He felt “it wasn't because of my grades, [but it was] because I'm Brown and doesn't expect me to be much.” Although this undoubtedly hurt him personally, it fueled a spark that motivated Gabriel to work harder in his mathematics classes in high school. He wanted to take all the toughest classes to prove the teacher wrong. Gabriel had positive experiences with other teachers, though. He recalled his home economics teacher strongly encouraging him to pursue cooking. He pointed out that his high school English teacher invited him back to talk with current students after he graduated. He specifically talks about a Korean wrestling coach who spent a little bit more time with him than other athletes, reflecting the positive influences overall from his teachers and coaches in high school. In addition, Gabriel has had supportive influences from his colleagues, peers, and professors during his post-secondary journey. His current TEP professors, as he noted, are very supportive, not only educationally and emotionally, but even financially by providing extra textbooks he could not afford or paying for a certification exam that was very costly.

Being/becoming a teacher: Critical experiences. While starting his college education at a community college, his return to academia sparked his interests in teaching mathematics again. He remembered the feeling his eighth-grade teacher created in him by denying him access to challenging mathematics classes. He wanted to make sure others did not experience similar occurrences. Mathematics has always been challenging for Gabriel, and his interview conveyed

that it did not come easy. It seemed from his comments that he wanted to use his experiences to help others.

Additionally, while earning his associate degree, Gabriel enrolled in an anthropology course which required him to work with a community organization. He chose to work with a local Latinx organization helping others learn English as well as a plethora of other skills. During his time volunteering, he taught adults English and was inspired to reconnect with his native culture. In doing so, Gabriel thought of his nieces and nephews and wanted to be a positive influence in their lives by showing them that he could succeed as a teacher, and in particular, that he could do so while looking like them. Likewise, Gabriel's experiences volunteering at a new private school with minoritized students gave him a feeling he did not expect. One of the minoritized students at the school became drawn to Gabriel, and he was not sure why until the student told him "you're Brown like me." This provided more assurance that he was pursuing the correct career path.

Gabriel's experience with his TEP was positive. His college did not focus on mathematics education in particular, but rather teaching secondary schools in general. Gabriel did participate in two STEM teaching internships which provided him with much-needed direct experience in teaching STEM subjects. Gabriel believes his TEP did not prepare him to be a minoritized mathematics teacher but rather a general teacher. A substantial barrier to finishing the program and becoming a teacher would be the financial burden of not being able to receive financial aid due to a mistake he made when he was in high school related to his undocumented status. Another barrier was his worry that other teachers, parents, and even students would doubt his credibility because of his race. He referred to literature he had read on Black professors constantly having to defend their credibility not to students, but to other faculty and to parents.

Gabriel believed support from other veteran and non-veteran teachers may be the most important factor in staying in the teaching profession. He also believed support from administration as well as support related to classroom management will be big factors for retention. Through his interview, Gabriel expressed that he could provide extra benefit to his school and community by being a role model and fighting negative stereotypes placed on those who look like him. As he described in his interview, he wants to be a motivator by telling his story to all his students, not just minoritized students. Further, he conveyed that he wants students to overcome their struggles and to think critically about life around them. Gabriel exclaimed this idea when expanding on why he wanted to teach young students:

> Why do you believe the things that you believe? Do you believe it because your parents said so and that, you know, I mean, you live under their house? I mean, I'm not teaching them to be rebellious, but like is it because of that, like is it because of your obedience to your parents. Which I mean, again, I don't want to create rebels here, but like what makes you believe that this is true? Can you give me an experience, and what is your thought about it? I want my… I guess my whole approach to teaching is to help them think, help students think critically. Yeah, absolutely. Ground them and make an educated guess, make an educated decision, statement, decision and move forward with.

Gabriel's teaching philosophy is more grounded in creating critical thinkers than mathematicians. He believes once he teaches his students to question and provide evidence, then real learning and growth can move forward.

Summary. The individual threads evident in Gabriel's interview were significantly impacted by his minoritized status. First, as a Latinx male he had to navigate immigrating to the United States and discovering who he was and who he wanted to be while battling racism for

being Latinx. Second, Gabriel had many critical events with individuals, both supportive and restrictive, that either aided or hindered his pursuit for higher education and eventually teaching. Gabriel was an unconventional student who had to battle being judged by his skin color, being undocumented, and still having to deal with issues to this day for circumstances he was not in control of as a young child. Lastly, Gabriel's journey to becoming a teacher has been positive for the most part. Through his comments, he conveyed that he has had different experiences that have encouraged him to continue to pursue teaching. Gabriel's teaching philosophy is more grounded in teaching students to be critical thinkers rather than pure mathematicians. Gabriel expressed concerns about finishing the program due to financial restrictions, but more interestingly, he worried about how other peers, parents, and students would view his ability to teach mathematics effectively. He was not the only participant with this concern.

Participant #4- Bethany

Bethany was another current preservice mathematics teacher who identified as mixed race or multi-racial since she was three-fourths Asian and White. I taught Bethany in her introduction to STEM education courses as part of the TEP at a four-year University. A number of themes emerged in Bethany's interview. These included diverse education, critical individuals, and becoming/being a teacher with the emphasis on the importance of diversity in education.

Diverse education. Bethany had an interesting experience growing up in Japan attending both private, international schools, as well as public, local Japanese schools. Bethany grew up with many different cultures since she attended an international school for most of her time in Japan. Diversity of the students was the norm, but most of her teachers were Japanese with a few White, English teachers. Although spending most of her childhood in Japan,

Bethany's family moved to the Southeastern United States to a predominantly White, affluent neighborhood. This neighborhood is often referred to as the "bubble" by her and her peers since there was a lack of diverse cultures and socioeconomic statuses. The neighborhood is very homogenous with a few outliers. Bethany described her neighborhood school as very competitive, as seen in her comments.

> My high school was definitely a very competitive environment. Everyone strove, just strove for the best. Like they wanted to be the best and they want it to be the top of the top. And so, I think, it was definitely a competitive environment. I just remember one experience of my, like all my friends getting super high thirties on their ACT scores. And even if they got to 33, they were still complaining. They were like, Oh, I got a 33. And it, I was like, am I supposed to get that? Like, is that like normal? Then I would ask all my friends from other schools and they'd be like, oh yeah, 33 is like super-duper good. If you can get a high 20, that is good enough. But then I would hear kids from my high school being like, Oh, that's not good enough. And so that definitely was a different environment for sure.

Bethany's experience in her competitive bubble drove her to push herself even further academically. She wanted to be at least on par with her peers. But that did not mean she did not question whether this was a common theme throughout other people's high school experience. Asking peers from other schools definitely gave her some perspective on how competitive her high school bubble really was.

While in Japan, Bethany mostly saw Japanese teachers, as mentioned before. When she moved to the United States, she only experienced school with teachers who were White. Bethany conveyed through the interview that she always looked up to her teachers, no matter what race

they appeared to be. Bethany's experiences with namely all Japanese teachers provided her with examples of what teachers who looked like her could accomplish. Equally important to her pursuit of education as a career was her home life. In the next section, Bethany expresses how her family and social life impacted her decision to maintain high academic expectations as well as sparked her interest in pursuing teaching as a career.

Critical individuals. Bethany's parents provided high expectations for her success in academia. Luckily for Bethany, her parents were never pushy about their expectations. Additionally, she has always been self-motivated to do well in school. One unique experience for Bethany was trying to learn both English and Japanese since her mother spoke mainly Japanese and her father spoke mainly English. Therefore, while living in Japan, Bethany had an opportunity to experience a bit of American culture from her father and international schools. Bethany's peers, especially in high school when she moved to the affluent, White neighborhood, were very competitive and motivating. They were constantly comparing GPAs, ACT scores, as well as hobbies. Her peers really pushed her further to succeed and do well academically. She also mentioned her peers' lack of experiences in the real world because they lived in a bubble and experienced culture shock when leaving the bubble. As Bethany stated in her interview:

> I've talked to all my friends, and we call it the bubble for a reason. And it's just like, I think people get on their high horses, and they think that every time until they get to college. I think we've all realized once we get out of the bubble and once, we get to college, we see so much more, and we see so many different people and so much diversity. And so, I think definitely bringing that into like a high school level, or even secondary, like middle school would definitely help to open like kids' eyes rather than,

> than them like being thrown into suddenly going into college and being like, well, I didn't know there was an outside world than just this little bubble.

Through her comments, Bethany recalled how much of a culture shock it was to attend a four-year university outside of her bubble and how being exposed to more real-world events and individuals could positively impact students who typically only see homogenous societies within their own bubbles.

Bethany always had role models of exceptional teachers in Japan as well as at home with her mother. Her mother worked in a daycare and was deemed a “baby whisperer” by many. Bethany saw how much her mother loved and impacted children’s lives and wanted to follow suit. In addition to her mother, Bethany had a younger sibling and often found herself playing the teacher role for her sibling. After reflecting on our interview, Bethany realized that students who came from the same bubble as she did in high school could greatly benefit from a more diverse teacher workforce in order to be more prepared for the real world of diversity.

Being/becoming a teacher. Bethany’s love for teaching started in middle school and was confirmed in high school. Her comments below reflect this idea.

> I think I knew definitely by high school. I knew I wanted to be a teacher. Middle school was sort of when it all started. So, I remember in elementary school in fourth grade, all my friends were like, Oh, I want to be a teacher. But I, I was like, Oh, I don't want to follow them just because they're saying they want to be a teacher. I'm not going to go down that path. So, I didn't know what I wanted to do, but then I've always watched, my mom has always been really good with kids and she's always like, been like a, um, basically a baby whisper and she's always just like, love kids. So, she works at a daycare. And just seeing her interact with kids has definitely inspired me. And then I have a little

> sister and we're seven years apart. So just growing up with, in that environment of like having a younger sibling and taking care of them and basically kind of like playing like teacher role, at times, definitely did start getting to go on the teacher career path. And then I think, I know for sure that during high school in senior year, like I knew I wanted to go into education. So, I applied to schools, an education like field, and I definitely wanted to go, I've had for sure, wanting to go into elementary education, but the university I decided to go to did things differently, so I made the change to high school since I did not want middle school.

Bethany was heavily influenced to pursue education as a career through her life experiences. Bethany did not necessarily have a specific moment that she can recall as the moment she decided on teaching but can recall specific reasons why she gravitated towards teaching. It is interesting to point out that she originally wanted to teach younger students due to her life experiences but ultimately chose to pursue secondary education over primary education because she wanted to pursue mathematics as major.

Bethany believed her TEP is a great program that teaches mathematics can be more than just focusing on mathematics alone as well as science is more than just science alone. She emphasized the collaborative effort to teach STEM rather than just one subject. She believed the TEP emphasized different perspectives which differed from her own high school STEM experiences for a more diverse education for all learners. As she noted:

> My TEP definitely was an experience that I didn't think that I would have experienced because I wanted to go to a super small Christian college up on top of the mountain. And so, it's definitely like opened my eyes to seeing like there's more than just being in one area knowing one thing because my university is a public school. It's definitely like

> they're open to, or they emphasize like, I guess, diverse learner learning and diverse backgrounds.

Bethany did not anticipate having to learn so many different perspectives and teaching strategies after coming from such a homogenous bubble where most students acted and looked similar. Many had similar goals and experiences which teachers could tap into without much differentiation.

However, Bethany did not believe her TEP prepared her to be a minoritized teacher, but rather a teacher ready to teach diverse populations of students. From her interview, Bethany did not consider all the different populations she would teach in the future. She was grateful to have been introduced to many learning theories and strategies that could be effective for diverse populations. The only barrier she mentioned in the interview was how long the program was since she was attempting to graduate early due to the fact most PSTs in the TEP have to take an additional semester to complete the internship required for teacher certification.

Bethany did not speak much about what it would take for teachers like her to remain in the teaching profession. She mentioned, however, the importance of educating teachers about diverse backgrounds of students, including how she wanted teachers to be able to serve as allies for students who may not look like the "norm." As an illustration, she recalled having to defend her Asian heritage to her friends as something that was a part of her overall culture, but her friends saw it as resisting the American culture. Further, she mentioned teachers making insensitive comments that encouraged a division among her peers and creating isolation even if the teachers did not mean to do that. As Bethany noted, "I think just like having people be open by having like an honest conversation with, or just like a dialogue with teachers." Bethany's

comments reflected a vision of herself as a role model for those coming from different countries, but also for all students.

Summary. Bethany's themes were focused on her diverse, yet sometimes, homogenous community experiences. First, one theme focused on how different her educational experiences were in Japan, in public and private, international and local schools, and then in the US, in her very competitive, homogenous high school filled with namely White students and teachers. The second theme focused on the critical individuals and experiences that led her to pursue teaching. These critical aspects included respecting and loving all her teachers from Japan and the US, to watching her mother take care of children, and to acting as a teacher for her younger sibling. Her peers initially deterred her decision to pursue teaching as a career, but Bethany eventually decided to pursue teaching. The final theme related to Bethany's narrative was being/becoming a teacher with a major focus on the importance of a diverse education with open-minded teachers.

Participant #5- Tiana

Tiana was a preservice teacher who identified as an African American, Black woman. I taught Tiana in her introduction to STEM education courses as part of the TEP at a four-year University. A number of themes emerged in Tiana's interview. These included opportunities based on race, critical individuals, and becoming/being a teacher with the emphasis on opening up her own charter school for minoritized students.

Opportunities based on race. Tiana grew up in an area in the Southeastern United States with families who looked like her and many of her teachers were minoritized, specifically African American. She said that there were many advantages and disadvantages growing up as a Black woman in her neighborhood. Most of her life up to the point of the interview, she had seen negative consequences of her identity based on race rather than gender. A major life instance that

Tiana recalled was that of being denied from a certain out-of-school summer program. The year before and after, Tiana was enrolled into the program but this particular year when she applied, she was denied. Interestingly enough, Tiana recalls being in a group chat message with other Black candidates and none of them were accepted. Tiana was appalled due to that fact she met all the requirements needed to be accepted. She wondered to herself why she had not been chosen. However, her father kept her grounded in her questioning. Tiana said her father tells it straight and often pushes her back to reality. Her father told her at the time that the situation is just one of a lot of situations or outcomes that race could possibly be a factor, so be prepared. He also clarified that there may have been other factors besides race that led to her rejection by the program. Tiana believed minoritized individuals often have setbacks but believes there is also an over-exaggeration. She elaborates on this point in the following excerpt.

> I [felt] being a minoritized individual growing up, a lot of people place more setbacks on us than there should be. I feel growing up a lot of people may over-exaggerate the things that we might go through, and I feel like it is hard being a minority, and I'm not going to deny the fact that some things are harder. I feel like personally... that's more [of] a reason for me, I can't speak for the other minorities, but I know that's more a reason for me to do what I do in life. But my future, I know being a minority I had friends who fit into that expectation of minorities used to do this, to do that, and I see friends just like surpass all of that, like myself. So, I don't really feel like minority has been a burden, but it is hard. I can say... I would definitely say that it is harder, but I feel like in some cases, I don't know, I guess it's just like how I was raised in the kind of mindset that I have, I do agree, and I can definitely say that is harder for someone... It is harder than someone who would not identify as minority, but for me personally, I just feel like in some cases, we make it

> harder, if that makes sense, we hold that mindset that, Oh, well, this person it's going to be easy for them, but... And I feel like we hold it against ourselves sometimes, but it definitely is harder, and we have... I feel like we do have to work as hard.

Tiana believed minoritized individuals experience hardships but understands that all people can experience hardships. She therefore believes that while everyone, including minoritized individuals, should recognize said hardships, they should not succumb to the over-exaggeration and fight harder to succeed.

Critical individuals. Tiana's parents were very strict, even to the point where her peers would tell her that her parents were strict. Since Tiana was very self-motivated academically, however, her parents never had to worry about her grades. This was not the same for Tiana's younger sister who is not as academically motivated. Tiana recalls earning a B in one class and fearing her parents would be disappointed in her. She was surprised when her dad said it is just a B and that it is okay. Tiana often relies on her parents, namely her father, for advice and support. In addition, Tiana said she liked to associate with a variety of different peer groups. This point is reflected in the following comments.

> I'm a type of person, I like to surround myself with different types of friends, so I like to have friends that are opposites. I had a group of friends, they were high achiever[s] like me and others didn't really care about their education, but I feel like the only reason I do that, and I do that to this day because I like to have friends who motivate me, so my high achievers, they also motivate me, but it's because sometimes with those kind of friends, I have a competitive mindset, I never make it a competition, but it's also like, Hey, my friends are getting straight A's, so I'm going to get straight A's. [But] I had to remind myself, some people don't just achieve [academic success], so I like to surround myself

> with those who may slack off, so I can be a motivator to them. But it also is a reminder that some of us who just really don't care, like I had some friends after high school, they didn't want to go to college, I have some friends who fall into that minoritized mindset stereotype, and having children early or like, not going to college.

Tiana's peer groups often served as motivation for her to succeed academically in school, but she also recognized that she, herself, could act as a motivator for them. She hopes to be a motivator for her future students as she is for her peers.

As mentioned before, Tiana attended schools with peers who looked like her. There were a mix of namely African American students with some Latinx students, as she described. She only attended two schools before entering post-secondary education. During her elementary school experience, most if not all of the teachers at her public, neighborhood school were African American. When she decided to attend a charter school for her middle and high school years, the number of minoritized teachers declined, though there was a decent mix of races reflected in the teachers. The founder of the charter school intentionally focused on improving outcomes for minoritized students by prioritizing discipline and professionalism.

Tiana credits many of her teachers for her drive to become a teacher, but two teachers stand out the most. In eighth grade, Tiana's mathematics teacher was the first to encourage Tiana to start tutoring and leading class discussions on certain mathematical topics in which her peers were struggling. As Tiana comments:

> I actually decided to pursue education in eighth grade. I literally remember all my math teachers playing a role, but ironically none of mine were minorities, none of them. They were all women who weren't minorities, what... I can say they had a lot of respect and dedication towards helping minorities, I remember deciding in eighth grade we had one

> teacher in particular… I say this a lot to people when they ask me, why do I decide to become a math teacher? But I remember one day, she called me out, she knew how passionate I was about math, and I remember I always passed out my tests, homework, quizzes, and everything. And she asked me one day, could I tutor outside of school? After school, and I remember telling her like, no, I don't want a tutor. I feel like it was a fear. And I remember she called on me one day, she asked me to come to... In front of the class and explain how I got a problem. And I remember sitting there looking at her like, No, I told you No, I can't do it. And I remember she was just telling me to, "come on Tiana, yeah, everybody else doesn't understand it. Can you come explain it?" I remember feeling so nervous and literally was about to faint, and I was like, No, I can't do it. I remember she came over to me because she was like; your class needs you... She said just imagine if you felt like your classmates, you [would] want somebody to explain it, and I was like, Yeah, so I got a ton of the questions [from my classmates] ... I remember just standing there under pressure, and I just started working out the problem. And my class was asking me questions and it was coming out naturally, everything seemed fun. I remember going up to her after school, and I was like, Hey, can you call on me tomorrow in class. She was like, I don't know, I thought you didn't like it... And I was like, No, I loved standing up there, like explaining to the class, and they were asking me questions.

Although Tiana accredited all of her mathematics teachers as positive influences on her deciding to pursue mathematics education, this one teacher really pushed her outside of the box. Tiana might not have considered teaching even though she was passionate about the subject. Tiana also recalls her Algebra 2 teacher making a positive impact on her choice to pursue teacher education in mathematics.

> I had another math teacher, and I remember she was my Algebra 2 teacher, and she used to let me grade and make lesson plans and everything with her... I said to her, Can I teach the class today? And she was like yes, [I remember thinking my] math teacher [is] letting me [teach], it was just a great experience, and it was all because of my eighth-grade teacher, and she just randomly called on me to stand in front of class. I was under pressure once I got up there, I was just like, I could do this for the rest of my life.

In the previous excerpt, Tiana describes her substantial experience with teaching in her eighth-grade math class. Further, the experience of being encouraged and being in front of the class translated to an experience with teaching from Tiana's point of view.

Another major factor in deciding to pursue education was growing up in a neighborhood school where there was a lack of resources allotted to her school. There were no textbooks, only photocopies of books. Tiana saw injustices growing up, and during the time of the interview, she expressed that she wants to be an ally for those who battle these injustices daily.

Being/becoming a teacher. Tiana was not initially convinced her TEP was right for her. She noted that she was often the only person of color in her classes. After the first day of classes her freshman year, she called her dad thinking that she was not in the right place. The excerpt below describes this exchange.

> Well, I don't think that I'm supposed to be a teacher because I'm surrounded by people that are wanting to become teachers that don't look like me, and my dad was just like, that's more reason why you should want to become a teacher because it is rare for teachers that look like you. And I was just like, I don't know. And I remember I'd never want to answer questions, I never wanted to speak up, but I formed relationships… It was

> just like a fear that they didn't look like me, but that was a lot of my classes to be sitting around people that didn't look like me.

Tiana stated she did not want to speak up or answer questions in class because she was afraid of not sounding smart. But when she became comfortable, she understood she belonged, and her opinions were going to be valued.

Tiana's TEP also brought on tutoring opportunities for her. She tutored over 20 kids since joining the program. Another benefit Tiana received from the program was her ability to go into real classrooms her freshman year of college. She did not know of any other TEP that allowed freshman students to have in-school placements that early. In addition, during her freshman year in an Introduction to STEM Teaching course, she was placed in a middle school where Tiana has now decided she wants to teach middle school grade mathematics.

Tiana believed her TEP prepared her to be a great mathematics teacher but not a minoritized one. She believed the lack of racial diversity in the program restricted her ability to gain that knowledge. She did not think there were enough teacher candidates to have a major focus on preparing minoritized teachers even though she would have appreciated it. She elaborates on this idea in the segment below:

> There actually is a difference in teaching minority students, and I feel like we don't really hone in on that topic a lot, and I feel like one reason... Me as a student, I don't bring it up too because I feel like sometimes when I bring it up there is this uncomfortableness that it brings, and I'm not sure if I could speak up about things like that, and we do have certain topics [about minoritized students], but I just feel like I don't really see that in the [TEP] classroom, but I know coming from a high school where we talked about stuff like that, and I remember, even teachers that weren't minority would frankly say how you know,

> Like in the real world, you have to work like this or being a student using that, but I don't feel like here at this university, we get to talk about that as much, but I feel like it is because there aren't a lot of minorities inside of the classroom because I know the education class I take right now I'm one of two.

Tiana's comments emphasize the importance of students having opportunities to talk about issues related to race and the need to have more diversity in University coursework.

During her interview, Tiana considered some barriers to finishing the TEP. For example, she noted that sometimes she loses motivation to become a teacher, and she experiences fear and uncertainty about becoming a teacher in the current political climate. In addition, Tiana seeks to become a middle school math teacher, and the rigor of a mathematics major is a hinderance to her finishing the program. Along with these barriers, having to take an additional semester of college to finish her TEP also brings into question her willingness to stay in the program.

Tiana, through her comments, shared a belief that student success is the most important motivator in retaining minoritized teachers in the profession. She specifically recalls seeing minoritized teachers at her high school leaving schools or the teaching profession itself due to their lack of student success and internalization of the problem as their fault.

> I actually had a personal experience with a minoritized teacher that I had [as a teacher], I can speak for it, but I remember... Back in my high school, we had an African American male teacher, and he taught my African American history class. My school was really big on test scores and pushing students. I remember the students that he taught the class too... I was actually in an honors class, and we had honors AP classes and stuff like that, but the class that was just like a regular class that weren't performing as well. And I feel like he took that to say like he wasn't doing well as he should as a teacher. And so, I

> remember he came to speak to us and was just like this is something I have to walk away from, students cheating their way out, and he was just like, he no longer and wanted to teach.

Tiana's experiences with a minoritized teacher who put a lot of pressure on himself to show student success through test scores has gotten her to think about student success or rather lack of student success as a major factor in retaining minoritized teachers. In addition, Tiana believed she could provide an additional benefit to her school and community due to her experience at a charter school directed towards minoritized students. She noted her desire to open up her own charter school back home and also focus on discipline and professionalism.

Summary. Tiana's themes were significantly impacted by her minoritized status. First, her educational experiences growing up in a homogenous neighborhood with those who looked like her molded the type of person she is currently. Everything was not always a positive experience growing up as an African American, Black woman from her perspective. Second, Tiana was greatly impacted by critical individuals in her life including her family, peers, and teachers. Lastly, her pursuit to become a teacher has not come without some doubt and reflection. Ultimately, Tiana was proud to be in her TEP and to become a teacher who can later open up her own charter school similar to the one she attended back home.

Participant #6- Peter

Peter identified as an African American male who grew up in the Southeastern United States. Peter was my student in the introduction to STEM education courses as part of the TEP at a four-year University. A number of themes emerged in Peter's interview. These included opportunities based on race, critical individuals, and becoming/being a teacher with an emphasis on being an engineer or a teacher.

Opportunities based on race. Peter grew up in a low-income neighborhood and attended public schools. His neighborhood and schools were fairly homogenous with namely African American students and teachers. As he noted, Peter's schools rarely had updated textbooks and resources. To Peter's surprise, he did not realize this lack of resources until he attended engineering summer camp his senior year of high school and then re-affirmed his suspicion once he attended post-secondary school. The following comments reflect this idea.

> Because most of my life, I grew up around the people with my skin color, people of the same look as me, so you really didn't notice anything different. But when I got here [to my college] ... It was very different. It was actually before I enrolled, I went to a summer camp engineering program. And most of the people there were either white male or a white female, and so with that, when I got there, I realized that I was probably far behind because, one, my ACT score was a lot lower than everyone else, and just talking to them about where they grew up in the schools. It was much different. Most of them went to private schools, and they had like special training for the ACT while I just went to a regular public school.

Peter never considered himself to have a lack of resources until he was faced with opportunities that showed him what resources could look like to affluent communities. Peter, growing up in a low-income neighborhood with people who looked like him, never considered himself disadvantaged until he saw what other White counterparts had. Peter did not get discouraged from these experiences but rather the opposite as indicated in the comments below.

> Personally, it made me want to work harder because I feel like I'm behind, so I want to get on the level where other people are, but also, it's kind of unfortunate that we have to deal with being at a disadvantage like that without being exposed to all the resources the

> others are exposed to, but again, personally, I use it as motivation, like I have to work harder because I don't have those resources.

Peter experienced mostly success in his K-12 education, receiving all A grades with only one B. In elementary and middle schools, he attended enrichment programs for gifted students. Unfortunately, in high school there were not a lot of AP classes available, even at his STEM-focused public school to which he transferred. Although there were not a lot of AP courses, Peter credits a lot of his interest in STEM to this new high school. He comments:

> I transferred to another high school that focused more on STEM, with that I had an opportunity to get involved in science competition called Science Olympiad. Yeah, that was probably the best opportunity I've ever done. I'm glad, I got the opportunity to do that because it made me realize that I actually did want to do engineering because before that I didn't really know what engineer was, and my teacher, she pushed me to get into it, but I didn't really want to because I didn't want to get out of my comfort zone, but eventually I was like I'll join, and I ended up being the best time in my life, and it made me realize that I even wanted to do computer engineer or electrical engineer.

Peter, similarly, to Tiana, was encouraged to step outside of his comfort zone. A teacher recognized his potential and stimulated his interest in the STEM fields. Without teachers who actively seek out minoritized students with high potential, many minoritized students would never consider STEM fields or STEM teaching. This became increasingly clear when listening to the individual narratives of the participants in this study.

Critical individuals. Peter has had multiple critical individuals who encouraged him to pursue STEM fields including becoming a mathematics teacher. First, Peter's father had high expectations for him academically. Peter was fairly self-motivated, so his father did not put a lot

of pressure on him since he was succeeding. Peter mentioned his father pushed his brother more frequently since his brother was not as motivated on his own. Peter's parents valued education but did not help him much with schoolwork. Luckily, he had an older cousin who he could ask questions if he had any.

Peter chuckled once I asked him questions about his peers. He said many of his friends did not value education as much as he did. They were not against it, but many of them dropped out of post-secondary schools or never attended. Peter still communicates with his friends from home, and they always remind him to remember them when he "gets big." Peter uses that as motivation. Conversely, Peter has two role-model peers.

> But I did have, I have two friends... Feel like a role model to me. I still talk to them now, and sometimes I would go in and ask them how they're doing and make sure they're okay, and sometimes I would ask them, like I asked one of my friends, for help on my work, because she's a chemistry major here, you can see and I'm taking chemistry now, and it's a foreign language to me, so a lot of times I'm asking her for help.

As mentioned before, most of Peter's teachers in the past were teachers of color who looked like him. The minoritized teacher in his childhood was a White teacher or a male teacher. Peter mentioned a few teachers specifically who made a major impact in his life. First as previously mentioned, his engineering teacher who was a White, female teacher pushed Peter out of his comfort zone and into the world of engineering. Second, his eighth-grade mathematics teacher was his first African American male teacher. This was the first time Peter realized teaching was a possibility for him since he saw someone who looked similar to him teaching, as he commented. Lastly, his senior year of high school mathematics teacher, who was again an African American male teacher, solidified his decision to pursue teaching mathematics.

Being/becoming a teacher. This theme involved Peter's journey on deciding whether he'd pursue engineering or teaching mathematics. Peter always had a knack for teaching. "So, I teach, teaching has been something I've been doing my whole life is because I don't want to brag or anything, but I'm probably the smart one in my family". But the first event that peaked Peter's interest in teaching came from his experience working with his senior year mathematics teacher. Peter would ask to leave his study hall class to go to this teacher's classroom to help teach. As Peter describes:

> When we had study hall. I would just ask the teacher if I could go to his room. When I went to his room, and he would ask me to help his students like with their work and stuff, and I was just going around the class monitoring basically. And people who would raise their hands, I go would over, they would ask me a question, I would teach them how to solve the problem. I kind of used that as like a template for my decision, because it was like, okay, if I think that this is like basic teaching, I can do this and perfect it. Basically, I think I can be a pretty good teacher to help others...

From the comments highlighting his initial experiences teaching, Peter shifted to reiterate that teaching could possibly be his "plan B" if engineering does not work out.

As an engineer major rather than a mathematics major, Peter's experience is vastly different than his peers seeking mathematics teacher certification. Relative to his TEP, Peter shared several comments. Peter described that he is fairly new to his TEP. During his limited time in the program, he noticed that he was experiencing much more theory than he had anticipated. He thought the TEP would provide more information about "how to run a classroom" rather than multiple learning theories. Similar to the other African American participants of the study, in his interview, Peter conveyed that he understands that he looks very

different from his TEP peers but believed the program is not focused on his race but rather producing good teachers. The following excerpt makes this clear:

> We're all trying to be teachers, and we're all trying to become a teacher of math or science. I feel like that probably helped me a lot because instead of everybody just focusing in on me because I'm minority, it's like everybody's just trying to help each other, and we all just in this together. And I love the teamwork aspect in it, because with that, I don't have to worry about people thinking that I may not be able to do it because I'm black or whatever. I just worry about; can we all do this together? Can we all work together and get this complete... Can we all become teachers and hopefully make the world better?

Peter does not believe the TEP's curriculum is focused on helping him become a minoritized teacher but rather a general teacher. He did mention that he observed a real classroom teacher and that experiences such as those would "help me become a teacher as a minority." The only barrier Peter mentioned about finishing the program was his major workload as an engineer. His advisors mentioned that a very limited number of students have ever finished with an engineering degree and achieved teacher certification in his particular program.

While in the TEP, Peter has actually talked with a few teachers already about teacher retention. Through his conversations, he prioritized a positive working environment and was worried about teacher pay and long work hours. Because of the concerns, he considered teaching in college, as reflected in the comments below.

> I don't want to [teach in] college because I want to help younger kids. Basically, what they already want to do, I don't want to teach them [that]. I want to teach something that they don't know, so they [can] go do it later in life.

Peter also considered teaching in college but after reflection, he decided he wanted to reach students when they are young. He wants to be the inspiration for them to pursue a subject that they might have never considered unless a teacher encouraged them to pursue it. Peter certainly saw himself as an asset to any school or community he teaches at.

> I think there are a lot of things that a minority teacher could provide because outside of school, you do have students, and they're like, okay, since he looks like me. You know I can do that too. Or since he did it, and he's like me, I can maybe do that too. That's what I want to show my students, because partly, I didn't have that until I got to the eighth grade. That was when I had my first black male teacher. So, with that, it's like, okay, he's a teacher. Maybe I could possibly do the same thing and tell them how to be successful, because he was a great teacher. I definitely think I can help the community overall, but specifically the school, if you're an efficient, effective teacher, and you help your students understand what they're doing. That would definitely improve test scores, and if you improve test scores, I'm pretty sure you would probably get more funding for better technology, better foods and stuff like that, that would help the school in a long run.

Summary. Themes identified in Peter's narrative were again significantly impacted by his minoritized status. First, his reflection on the opportunities offered to students from neighborhoods like the one in which he grew up were drastically different from those inhabited by his peers from summer engineering programs or his current four-year university. Second, the critical individuals in his life ranging from his father, peers, and teachers who motivated him to succeed academically as well as pursue endeavors he never considered without their influence was the next theme. Lastly, Peter's journey to becoming a teacher is still in question because of the lucrative opportunities an engineering major can possibly obtain. Teaching is still "plan B"

for Peter, but he believed he could become a great teacher. Further, he viewed trying to finish the engineering program as well as his TEP could be a barrier.

Participant #7- Il-seong

Il-seong was a preservice teacher who was student teaching during the time of his interview. I worked with Il-seong in various capacities throughout his time with his TEP at a four-year University. Il-seong said he "sort of identifies as a minority," because he was born in South Korea but immigrated to the Southeastern United States when he was about 10 years old and has identified himself as an American or a Korean American. A number of themes emerged from Il-seong's interview. These included intersections with race towards assimilation, critical individuals, and becoming/being a teacher with the emphasis on being a loving ally for students.

Intersections with race towards assimilation. Il-seong has had an interesting journey from being an immigrant from South Korea to questioning whether he is a minoritized individual seeking mathematics teacher certification. Il-seong has not been back to Korea and the fact that the majority of his life has been lived in the United States, Il-seong believed he really was not a minoritized individual. He said the first five years in the United States, he did feel different and saw himself as a minoritized individual based on his lack of fluency with the English language and culture. From his interview, he made the following related comments.

> So, I definitely do not remember stuff back in Korea. So that's probably good. So, when first came to the US, though, I was enrolled in an ELL (English Language Learners) program. Well, my parents didn't think or like my dad is kind of very like gung-ho, I guess. I don't know. Or just like kind of like brute force kind of guy, I guess. So, he was just like English classes or like Korean classes. He doesn't need, he can just learn it on his own or whatever. So, I was just put into a regular American school. I didn't know a single

> alphabet letter, so I was just put on an ELL program, which didn't really help much because they're not designed just for Korean. They're designed for all ELL students. So as a matter of fact, I don't even remember how I got in trouble one time, but they made me write this one sentence like about 50 times. And I didn't know what it was at the time, but it was supposed to punish me, I guess.

This excerpt indicates how difficult it was for Il-seong to adjust to the American culture since his father did not want to provide him with additional supports. Il-seong believed his father was more interested in his son figuring it out on his own rather than providing these extra supports. When Il-seong first arrived in the United States, he remembers being treated very kindly. He stated in his interview:

> People were really generally kind to me. The teachers were pretty kind to me. I had support. Yeah, those are kind of like my experiences in the early days, I feel like I didn't really feel I was minoritized. Well, I guess like for the quizzes and exams, because I had to take like easier English exams and quizzes. Like when I remember specifically in third grade, I think, or second grade, the kids were getting a spelling quiz. And I had like a different spelling quiz. Like spelling words like Bee or not even Apple. Just like three letter words like box.

Il-seong recalls peers and teachers treating him with kindness and compassion. Teachers would try to differentiate his learning so he could be successful even though his father did not necessarily want the extra support. Il-seong believed he was supported as much as a public school could offer. At the time of the interview, Il-seong considered himself “way more American than Korean”. Il-seong believed he completely assimilated to the American culture therefore, he is not a complete minoritized individual. From his interview, he stated:

> I guess after I learned the language, it was more of learning the social cues and stuff like the social dynamics, and how it differed from Korean stuff. I guess one example is just, this might be kind of bad to say, but just like cursing, I guess, is the first thing you learn, cusswords. Yeah, but like especially in American culture. I feel like it just gives you that not power, but like social power. Especially with the group of kids, if you know a couple of curse words or whatever, it's like, oh wow. Like this guy was shy and didn't talk all the time, but like he can say these words, he knows how to communicate and stuff.

After learning the language, learning the American culture was the next step for Il-seong. Il-seong said when he started cursing more, his peers began to include him more and more as he was just another kid who just looked different.

Critical individuals: Support and resistance. As mentioned before with previous participants, Il-seong had critical individuals who aided or deterred his pursuit to become a mathematics teacher. First, Il-seong's parents were very strict on him while growing up as the first-born son. They had very high expectations of him academically but could not assist on any homework due to the language barrier. Il-seong's parents spoke to him in Korean at home and that is how Il-seong kept some of his Korean culture. Il-seong described his father as one who rules with "brute force" rather than care and empathy. Il-seong said he did not have a close relationship with his parents, but they were still on good terms as they always provided him with all the basic necessities growing up. Il-seong was very introverted growing up due to the fact he did not know the language well, and he was a bit shy, as he shared in his interview. While he had friends throughout his time in high school, he did not have many. He cherishes his time with his friends and also remembers the kindness of his peers when he first moved to the United States.

Il-seong communicated fond memories of his time in schools in the United States. He did not remember much about his education in South Korea but stated that the education system in the United States is “much more relaxed and caring than the competitive South Korea.” Il-seong remembers how his teachers cared for him during his transition to school in the US. The American teachers were caring and supportive, which was something was he lacking at home. He even said his teachers became “second parents.” Il-seong did not see very many teachers of color growing up, he said he saw no Asian teachers, only African American teachers. Relatedly, Il-seong did not mention one specific teacher who impacted him, but instead said all of his previous teachers contributed to his passion for teaching.

Highlighting another critical person, Il-seong knew in high school that he wanted to become a mathematics teacher after his classmate randomly asked him for help on his AP Calculus work. He commented:

> Yeah, so whenever one of my peers came to me for help, I really enjoyed helping them out and like teaching them like, hey, this is what I learned. Like, I think you should go about it this way. And, yeah, I just really liked that. That was one of the other reasons. Plus, I just look at like the jobs out there, I guess, and none of them really particularly interested me and then my parents, you know, that Asian mentality is like you ought to be a doctor or some lawyer. Yeah, but then they were like, actually, we don't think you'll do good with blood. So, I don't think you're going to become a doctor because you're too, like, introverted and just like shy or whatever. So, and then I told them, OK, I want to become a teacher. And then here's another rude awakening for them. That they're still kind of like figuring it out right now, I guess, or like they're just starting to figure it out.

> Teachers don't make as much here as in Korea. So, yeah, I told them what my wage might potentially look like and they just like, wait. That's it.

Il-seong's experience helping his peers with Calculus really encouraged him to want to become a teacher. I can remember supervising Il-seong during one of his Introduction to STEM teaching classes and how he specifically wanted to teach AP Calculus in high school. However, at the time of the interview, Il-seong continued to receive a bit of resistance from his parents in becoming a teacher even though he was about to graduate to become a certified mathematics teacher. They were not happy about the amount of pay teachers receive in the United States. Il-seong is considering teaching at an international school in South Korea for higher pay to appease his parents as well as to reconnect with his Korean heritage.

Being/becoming a teacher. Il-seong's pursuit to become a teacher was fueled by his love for his kind teachers. The warmth they showed him was lacking in his home life, and he explained that he wanted to be someone for students who grow up in similar households. As Il-seong stated in his interview when speaking about the American educational system compared to Korea's:

> If you do something wrong, like turn in something late. You just get bash, bash, bash like, you know, like there's no warmth in any of that. But in America, like, you know, if you are not performing well, if you're not doing something or if you don't turn in something, you explain it. And most of the time they'll be like, thank you for coming to me about it. Is there anything I can do to help you? They always try and help you out. They're not going to bash you right away unless it's for something really, oh, you messed up like you goofed off. But I think that's one of the things that really contributed to my successes, especially because, like I said, I didn't have the best relationship with my

> parents growing up. I liked being in school more than in my house most of my high school days. And most of that was because it was like a friendlier environment in the school and the teachers were just so kind you know. Like I felt like I could talk about anything with them and maybe they put off me a couple of times, but they were just generally good people that really want to help the kids out, you know. That's one of the reasons why I want to become a teacher too. It's because of those teachers that I experienced where, like, man, I love having this kind of relationship with them. Like they really want to help me out. It really helped me out growing up, having a kind of like second parent figure, I guess.

Il-seong expressed the need for a more caring, loving environment that was not apparent at his home. He did not believe there was any abuse or neglect, but his parents coming from a different culture did what they thought was best. Il-seong was finding his identity in America and needed more support from teachers because his parents lacked some American parental customs that he saw from his peers' families.

In addition, Il-seong appreciated the consistent support from his peers, mentors, supervisors, and professors during his time in his TEP. He had, however, a few criticisms of the program. First, he thought the classes could have been condensed into fewer classes as he felt some were redundant. Second, he thought some assignments were unnecessary busywork with unrealistic deadlines. He provided a caveat in that his criticisms are based on his time during the pandemic. There were many time and scheduling obstacles due to the uncertainty of Coronavirus-19. Lastly, he wished that school observations were scheduled on consecutive days rather than spread out through the semester so he could really get to know his students. But

again, he understood that scheduling would be the barrier in getting consecutive days accomplished.

> Yeah. So, it just felt like I was subbing for each day and I didn't get to know the students at all. The students didn't get to know me at all, and it just felt awkward like all of those like random teach things that might have been just me, but that's how I felt. I felt like I would have gotten a lot more if I just took over like two days in a row, three days in a row or something.

The only barrier that would prevent him from completing the TEP would be the edTPA (large lesson plan artifact) requirement. He believed it was too much work to do while he was taking classes and student teaching. And again, he believed a lot of it might have been due to the Coronavirus-affected scheduling.

Il-seong's primary retention requirement would be support from veteran teachers and administration. Support from other teachers, especially during his first few years, could be crucial to avoid burn out and even imposter syndrome. The administration needed to support teachers in classroom management. Il-seong knows a pay increase would be beneficial but does not believe teachers are pursuing teaching "for the money." Il-seong believed, even though he does not consider himself a fully minoritized individual, that he could provide extra benefits to his students, school, and community since he speaks multiple languages and can connect with students like him – introverted immigrants without a lot of parent involvement or students from exchange programs.

Summary. Il-seong's themes were again significantly impacted by his newly unclaimed minoritized status. Il-seong believed he was a minoritized individual when he first immigrated to the United States, but now considers himself Korean American or even just American. His first

theme focused on his journey to assimilate to American culture. The next theme looked at the critical individuals who supported or resisted his pursuit to become a teacher. The last theme focused on his pursuit to become a certified teacher who is a loving ally to his students. Il-seong believed that the care and love he received from his teachers was a major factor in pursuing teacher education. The next section will focus on the resonance of the narrative threads, looking across the individual participants finding similarities and differences amongst the different participants.

Resonant Narrative Threads

The previous section examined the individual narratives that emerged from the one-on-one interviews and were confirmed by those who participated in the focus group interviews. This section examines resonance (Clandinin et. al., 2012) across the narratives. Clandinin defined resonant threads as "threads that echoed and reverberated across the accounts" (Clandinin et. al., 2012, p.14). Therefore, similar themes and significant differences were identified across the narratives. The seven major themes discussed in this section start with minoritized identity and the immigrants' pursuits to assimilation to American culture. The next section discusses the critical individuals that were either supporters and resistors to the participants academic success or the pursuit to become a teacher. Within experiences with these critical individuals, aha moments depict times of when the participants decided to become teachers are compared among participants. Next, the participants experience with their TEPs and their voice within TEP are evaluated. Lastly, what participants considered to be the most important factors for minoritized teacher retention will be discussed.

Minoritized Identity

Every participant in the study identified with a minoritized identity to some degree, although this seemed to play out for individual participants in different ways. One notable difference was that Il-seong no longer considered himself a minoritized individual anymore. He felt that he successfully assimilated to the American culture. He even has a preferred English name that is not written on any official government document because it seemed easier to state as his English name rather than try to teach others his real name given at birth. Another second distinguished difference was the way Sydney questioned whether African American was the correct label for her since her mother was mixed race with her Mexican and African American background. Also, as a third illustration of difference, Sydney questioned whether the African in African American was accurate for her since she herself did not come from Africa. And, as a fourth example, Bethany, on the other hand, outright said she was mixed race since her father came from a White and Japanese background while her mother was full Japanese. However, when referencing racial category in documents, she considered herself Asian American.

Across narratives, another prominent theme related to being a minoritized individual was the interpretation of the need to assimilate or rather possibly searching for identity. From the data, there was evidence of assimilation or self-identity positions related to immigrants and to those who were also born in the United States. Concerning the first group, Chu, Gabriel, Bethany, and Il-seong were all immigrants who moved to the United States before attending post-secondary education. They all received some education at their original country of birth, but Chu and Bethany came to the United States at a much older age than Gabriel and Il-seong. One theme across the immigrant participants was their drive to become familiar with the American culture as quickly as possible. They wanted to fit in, and they wanted to be treated as an equal to

those deemed as American. Reflected through their interviews, the Asian American participants did not find as much difficulty in fitting in with the American culture. They seemed to have had positive experiences with teachers and peers. While they all said they had strict parents, their parents were all supportive of a strong education and provided all the basic needs required to be successful in the American school system.

One significant difference was evident in Gabriel's and Il-seong's narratives. Gabriel, who identified as Latinx, struggled to fit in as reflected in his comments. He could not figure out his social status in America. He was not Mexican enough to hang out with the other Latinx population in his city but was too different to fit into what he deemed as the American category. Gabriel struggled for a long time trying to identify himself. For the longest time, he looked down at those who looked like him but could not speak English. He was convinced he was superior until he was surprised with the information that he was undocumented and therefore ineligible to attend post-secondary education. As he said in his interview, he was "humbled" by the news. He began to search out more about his heritage and began studying Spanish literature. As mentioned before, Il-seong did not fully consider himself minoritized. He saw himself as either American or at least Korean American. He was not sure how to characterize himself because his view of himself as American may not align with how others view him. As Il-seong described in his interview:

> I identify as South Korean, but I definitely feel I'm not like one hundred percent Korean. I definitely feel like I'm Korean American or more American at this point because I came here when I was nine. I never visited Korea back since then. So, yeah, my Korean knowledge and my Korean language is just like a first grader [in Korea]. So, whereas

here I've gotten that American culture and that knowledge of being a college kid in America and stuff. So definitely feel like I'm more American than Korean at this point.

Although Il-seong stated he felt more American than Korean, he believes that his identity can be affected by those close to him or even strangers he interacts with in his daily life. It is notable that struggles with self-identity are not restricted to just immigrants, as even those born in the United States still struggle to completely feel comfortable identifying themselves.

The second group of minoritized individuals including Sydney, Tiana, and Peter were born in the United States and offered some different issues compared to the immigrant experiences noted above. This whole group ended up being comprised of the African American participants who did not struggle with trying to assimilate, as they already saw themselves as part of the American culture. For example, Sydney had a hard time placing herself into one category of race but self-identified herself as African American, even though her mother partly came from a Mexican background. She was unsure of what she should categorize herself as but described herself as African American because it was something with which people were familiar. Tiana and Peter, on the other hand, had no issue identifying who they were as they lived in homogenous neighborhoods with individuals who looked, spoke, and dressed like them.

Critical Individuals: Support

A third theme that revealed itself related to the parents and teachers of the participants. It seemed that all of their parents provided support through their positive valuations of education. All the participants' parents valued education, but not all participants' parents were directly able to assist in their children's education. This theme is exemplified through Peter's quote about his parents, stating "they weren't really involved with my education because they were more so working, so they didn't really get involved, and if I do have a question, my dad usually said it's

been so long, he forgot." The participants often had to find alternative supports including teachers, counselors, family members, and/or peers. In addition, all participants at one point in time had a teacher who supported them to pursue mathematics further. What became clear was that teachers were the most influential support systems for those seeking to teach mathematics. These teachers often were not minoritized teachers, but teachers who cared about students. This theme of support was expressed thoroughly through Il-seong's comments about his teachers and parents:

> I didn't have the best relationship with my parents growing up. I liked being in school more than in my house most of my high school days. And most of that was because it was like a more friendlier environment in the school, and the teachers were just so kind. I felt like I could talk about anything with them and maybe they had put me off a couple of times, but they were just generally like good people that really want to help the kids out, you know. That's one of the reasons why I want to become a teacher. It's because of those teachers that I experience where, like, man, I love having this kind of relationship with like they really want to help me out. It really helped me out growing up, having a kind of like second parent figure, I guess.

Il-seong's comments illustrate the overall support that teachers provided to most of the participants, and it was this kind of impact that the participants hoped to create with their own teaching or at least, it was what was attractive about teaching to them.

A significant difference related to critical support individuals had to do with the minoritized status of the teachers experienced by the different participants. Sydney, Chu, Gabriel, Bethany, and Il-seong all said they saw very few minoritized teachers in the United States. Interestingly enough, the remaining participants, Tiana and Peter, grew up in homogenous

Black and Latinx neighborhoods with the majority of their teachers being Black and Latinx. Although, they had different experiences once they transferred from their zone neighborhood schools and opted into either a minoritized student success charter school or STEM-focused school. For example, Peter stated that:

> I transferred to another high school that focused more on STEM, with that I had an opportunity to get involved in science competition called science Olympiad. Yeah, that was probably the best opportunity I've ever done. I'm glad, I got the opportunity to do that because it made me realize that I actually did want to do engineering because before that I didn't really know what engineer was, and my teacher, she pushed me to get into it, but I didn't really want to because I didn't want to get out of my comfort zone, but eventually I was like I'll join. And it ended up being the best time in my life, and it made me realize that I wanted to do computer engineer or electrical engineer.

Without the support of his engineering teacher at his new STEM-oriented school, Peter would have never even considered engineering as a future career.

The different types of supports from critical individuals for these participants experienced throughout their lives were very different and individualized. But the commonality between all their narratives is that all parents supported educational success and maintained high expectations for their children but could not necessarily provide personal supports regarding specific subject matters. Most participants seemed to rely on or were pushed by a teacher(s) in different ways their parents could not support. The next section will examine the similarities and differences of our participants' resistors to becoming a teacher.

Critical Individuals: Resistors

As individuals provided support, as conveyed through participant interviews, individuals also provided some kind of resistance to the participants' intentions to pursue mathematics teaching. The major reason for resisting becoming a mathematics teacher came from their families concern about the adequacy of teacher salaries. Sydney, Tiana, Peter, and Il-seong's families all wanted them to "earn higher than average salaries" since they were in lucrative fields of mathematics or engineering in Peter's case. The rationale was due to financial stability. All participants questioned and revisited their decisions to pursue mathematics teacher education because of the concerns expressed by their families, but ultimately the participants decided that a high salary was not the major factor in their decisions to become a teacher. This theme is made clear in Sydney's comments about her decision to continue pursuing becoming a mathematics teacher. As she notes:

> My grandparents, they were like, Sydney, if you're going to school for math, don't be a teacher. And they kind of skewed my viewpoint a bit. And I was like, should I do something else? Because they made me feel like I was settling... They were like, you're smart, so why are you going to pursue a math degree, then just going settle on being a teacher? And I was like, I guess, yeah, you're right. I mean, why am I just going to settle on being a teacher, but then I realized that I wasn't settling on being a teacher. They wanted me to go and work and get money, which is fine. Money is great, don't get me wrong, but I was like, I was not going to be happy with that. Man, of course, I'd be happy, but was I going to be genuinely happy? And I realized I wasn't going to be genuinely happy with that, so I went back to teaching.

For most of the participants, becoming a teacher serves more than just earning a salary; it is about making a difference in students' lives, similarly how other teachers have changed their lives.

Reflecting one significant difference, Gabriel's resistor came in the form of an eighth-grade mathematics teacher. His teacher was a White, female who recommended Gabriel take below grade-level mathematics coursework during his freshman year of high school. Gabriel has always been confused about why he was placed into such a low performing class. Instead of harboring negative feelings, Gabriel used the actions of the teacher as motivation to pursue high-level mathematics in high school. As the participants' journeys make clear, they decided to carve their own paths in spite of resistance from some critical individuals in their personal lives. It seemed that these tough life decisions created critical decisions in which the participants chose to listen to their own voice rather than the voice of their resistors. However, the resistors did play significant roles in motivating participants in some cases, such as Gabriel's. These critical individuals, these resistors, often play a role in what I call aha moments when individuals decide to pursue teaching.

Aha Moments

All participants pinpointed one moment or event in their lives that convinced them to pursue mathematics teacher education. These aha moments seemed to share some commonalities, but also concrete differences. Sydney, Bethany, Tiana, Peter, and Il-seong all decided fairly early in high school that they wanted to pursue teaching mathematics. Sydney, Peter, and Tiana, who identified as African American, all had a specific teacher they identified as someone who pushed them to teach mathematics. Bethany and Il-seong attribute their decision in wanting to become a teacher to all of their teachers while Bethany also voiced admiration for her

mother's work as a childcare provider. Sydney, Peter, and Tiana never considered teaching until their critical individuals in the form of mathematics teachers pushed them outside of their comfort zones and identified a skill trait that the participants themselves never knew they possessed. For example, in the case for Tiana, she states:

> I say this a lot to people when they ask me, why do I decide to become a math teacher? But I remember one day, she called me out, she knew how passionate I was about math, and I remember I always passed out my tests, homework, quizzes, and everything. And she asked me one day, could I tutor outside of school? After school, and I remember telling her like, no, I don't want a tutor. I feel like it was a fear. And I remember she called on me one day, she asked me to come to... In front of the class and explain how I got a problem. And I remember sitting there looking at her like, No, I told you No, I can't do it. And I remember she was just telling me to, come on Tiana, yeah, everybody else doesn't understand it. Can you come explain it? I remember feeling so nervous and literally was about to faint, and I was like, No, I can't do it. I remember she came over to me because she was like; your class needs you... She said just imagine if you felt like your classmates, you [would] want somebody to explain it, and I was like, Yeah, so I got a ton of the questions [from my classmates] ... I remember just standing there under pressure, and I just started working out the problem. And my class was asking me questions and it was coming out naturally, everything seemed fun. I remember going up to her after school, and I was like, Hey, can you call on me tomorrow in class. She was like, I don't know, I thought you didn't like it... And I was like, No, I loved standing up there, like explaining to the class, and they were asking me questions.

For participants such as Tiana, having a critical individual see something in her that she herself never saw was the critical aha moment she needed in order to pursue mathematics teaching.

A couple of nuances worth mentioning have to do with how the aha moments played out for two categories of participants. First, I say more about the high school teachers who impacted Bethany and Il-seong. Bethany always had a respect for all her teachers no matter whether she was a student in Japan at an international school or public school or when she moved to the United States. Bethany considered teaching even earlier when many of her peers were expressing interest in becoming a teacher. Bethany resisted that consideration as she did not just want to follow the crowd, but in high school she realized teaching was her career path. Il-seong who claimed to be severely introverted, and a shy, quiet student used his mathematical ability to tutor his peers in Calculus. He found himself being able to express himself through teaching mathematics. Il-seong stated in his interview:

> Yeah, so whenever one of my peers came to me for help, I really enjoyed helping them out and like teaching them like, hey, this is what I learned. Like, I think you should go about it this way. And, yeah, I just really liked that. That was one of the other reasons. Plus, I just look at like the jobs out there, I guess, and none of them really particularly interested me.

Il-seong's ability to tutor his peers really solidified his decision to pursue teaching as other types of jobs were not interesting to him at the time.

Second, there is evidence that a self-realization can come later, beyond K-12 education as a result, in part from teachers. Chu and Gabriel identified teaching during their post-secondary journey. Chu decided to pursue teaching after reflecting on her original major of pharmacy. Chu remembered how tutoring peers in mathematics while not being able to speak English very well

impacted her later decision to pursue teaching. Gabriel, on the other hand, came into post-secondary education thinking he would pursue accounting as that is something he worked as in his adult life. Gabriel was a non-traditional college student due to his undocumented status. Gabriel always considered teaching, but never took it seriously until one of his college professors suggested he look into the profession. These two participants are examples of discovering a passion for teaching that is not always cultivated early on as a young student. The next theme will focus on participants' TEPs and the learning occurred and barriers within them.

Teacher Educator Programs (TEP): Learning and Barriers

All participants had positive responses about their TEP related to how the programs supported learning. Most or all of the participants expressed a number of positives including: mentions of how their TEP had supportive peers, mentors, and professors; the amount and frequency of real classroom experiences; and a major focus on embracing the diversity of students and their learning styles. Everyone except for Gabriel attended the same four-year university and experienced similar classes. The most important reason for the positive responses toward their TEP stemmed from the amount of classroom experience provided even early into the program. Those in their first year in the TEP program have the opportunity to go into real middle school classrooms.

In regard to minoritized individuals, there was one common idea expressed. Most participants felt that their TEP had a major emphasis on supporting minoritized K-12 students in classrooms, but not preparing minoritized teachers in particular. For example, Chu mentioned in her interview how her TEP started stressing the importance of implementing culturally responsive pedagogy into their lesson planning while she was a preservice teacher in the program. Chu agreed that this was an important task but wished her TEP would have provided

more concrete examples into how to actually to do this in concrete ways. It is possible that this observation is unique to Chu's situation. Chu immigrated to the United States later than the rest of the participants, and she is restricted to the amount of American cultural references she can rely on through her limited experiences in the United States. She may have needed more support and practice into how to implement these strategies aimed to be culturally responsive to all of her students, including minoritized students.

The lack of emphasis on minoritized PSTs might be related to the fact that the university as a whole, including the TEP, had a lack of diverse students. The program perhaps never considered the need for differentiated instruction of minoritized preservice teachers because they did not think there were enough minoritized candidates to need such instruction. Further, the participants never seemed to have considered that they would face different challenges compared to their White PST candidates. Without explicit references and strategies in terms of the different needs and challenges for minoritized PSTs, many minoritized teacher candidates will likely not consider how teaching can look differently for them. This theme was exemplified by the majority of the participants' responses. The participants did not really seem to consider the unique situations they might encounter and how to respond in such situations, with the exception of issues of parent perspectives raised by Sydney and Gabriel.

The major barrier mentioned throughout the interviews of potentially not finishing the TEP was the requirement for a mathematics or engineering degree. The non-Asian participants all mentioned how difficult their major classes were to become a high school mathematics teacher. They felt the requirement for the mathematics major could be a deterrent as it is one of the most difficult majors on campus. Il-seong also mentioned the difficulty of the mathematics major but specifically targeted the edTPA (teacher certification requirement) as his barrier to not

finishing the program. Many of these barriers are linked to requirements for teacher certification in the participants local districts as well as requirements for major and minor requirements within their individual universities. This brings into question whether these requirements are needed or can they be modified to be more equitable and inclusive. The next section will examine individual voice within the TEP as well as in terms of teacher retention.

Voice. The importance of voice came out in multiple facets through the participants interviews. I will draw on the narratives of Sydney, Tiana, and Chu to highlight aspects of this theme in terms of their individual TEPs as well as in terms of teacher retention. Sydney was the participant that was most concerned about her voice being heard and valued within her TEP and future career as a teacher. It is important to note, Sydney was not concerned about her voice being heard in her TEP about minoritized issues. She actually preferred not the volunteer her opinion and waited to be asked what her opinion was. She often had to emphasize that this is just her opinion and not those of all that may look like her. Sydney's concern about her voice was more focused on whether her teacher voice in the classroom would be valued or ignored. Sydney believed her voice needs to be valued and respected or she would move onto a different career within mathematics.

Tiana also spoke about voice in her TEP classrooms. Tiana initially was apprehensive about even speaking her mind at all in her TEP classes. She was often the only person of color in the class and did not want to say anything wrong that could be seen as "dumb". Eventually Tiana realized that her peers and professors valued her opinion, and she felt more inclined to speak up in classes. Chu, on the other hand, said that she felt as if her peers and professors really valued her different methods and strategies she brought from her experience in China. Chu felt it was a safe space to bring new methods to her peers as the TEP emphasize diversity of students and

teaching methods. It is noteworthy to recognize how voice was restricted and promoted within the same TEP, but participants internalized their own thoughts about themselves to restrict their voice or promote their voice. Sydney, in terms of her TEP, did not want to speak up about racial issues because she did not want to be a token African American PST who spoke for all African Americans. Tiana was outside of her comfort zone again when she first attended her four-year university because she was in a very White dominant setting. She was not initially comfortable giving her opinion because she was afraid to sound unintelligent in front of her White peers. Chu's experience was so different as she wanted to share her Chinese learned strategies. The next section will examine what the participants valued as the most important factors for teacher retention for those who looked like themselves.

Retention

The individual narratives reflected three key aspects that contribute to retention. First, the most common factor contributing to retention that arose from the interviews was support from veteran teachers as well as administrative staff. Participants wanted assistance from teachers who have already taught similar courses and had similar types of students. They also wanted their administration to back them up on classroom management issues. This is reflected in Gabriel's comments on teacher retention:

> I think the most important factor would be, you know, like the support from other teachers, veteran teachers, you know, like the ones that we know that we've encountered in our internship and some of that having their perspective and having their guidance. And, of course, there's a lot of, you know, online [resources] but, there's a lot of teacher a like a teacher material to help with class management and stuff on the [internet]. Having the support from the administration would be how helpful as well, because I mean, I

> understand it is a job. I fully understand that it is a job and it's a very, very, very important job because you're holding in your hands 20 to 30 minds.

Gabriel was just one of my participants who craved mentorship from veteran teachers. Gabriel also mentioned teachers he has encountered in his STEM teaching internships as again his TEP focused on general teacher education while the other participants all attended the same TEP. Gabriel was relying on his experience in his introduction to STEM teaching internships as models of what proper mentoring could look like for him.

The second common factor for teacher retention was student success. Chu and Tiana really believed that minoritized teacher retention could be related to their students' success. They both mentioned how high stakes testing and the value placed on them could deter minoritized teachers from retaining their positions as teachers if their students do not show academic success on those assessments. Tiana provided an example of this concern in her interview:

> I actually had a personal experience with a minoritized teacher that I had [as a teacher], I can speak for it, but I remember... Back in my high school, we had an African American male teacher, and he taught my African American history class. My school was really big on test scores and pushing students. I remember the students that he taught the class too... I was actually in an honors class, and we had honors AP classes and stuff like that, but the class that was just like a regular class that weren't performing as well. And I feel like he took that to say like he wasn't doing well as he should as a teacher. And so, I remember he came to speak to us and was just like this is something I have to walk away from, students cheating their way out, and he was just like, he no longer and wanted to teach.

Tiana's experiences with a minoritized teacher who put a lot of pressure on himself to show student success through test scores has gotten her to think about student success or rather lack of student success as a major factor in retaining minoritized teachers.

Lastly, Sydney and Gabriel had concerns about their professional credibility. Not that they did not believe they were qualified, but rather how their prospective students and/or parents would perceive their ability to teach and do mathematics. This is reflected in Sydney's comments below:

> I feel like maybe with parents, I could see maybe, especially because I'm a female, math teacher. And then I'm African American, so I can see with certain parents it being an issue, I don't feel like it would be an issue with any of my peers or anything like that, but I don't know for sure.

Sydney did not mention why she felt this concern about certain parents having an issue with a female, African American mathematics teacher explicitly, but Gabriel did speak on his reasoning.

> Like I said before, I feel like I would be under a microscope, like whatever I do. Whatever problem that may arise, is he fit to be a teacher, kind of thing? I mean, that's those are the thoughts that right now come to mind. I've read articles of, you know, African American professors being questioned, like, do you really know in mathematics? I mean, this is all on the mathematics spectrum. Surely, people are going to question whether or not I know the material. I know they're going to question, you know, my credibility, everything will be under a harsher scope. Yet, you know, I know I would be an asset because of diversity and all that stuff, but I mean, yeah, that's pretty cool and all.

> But like, the way, you know, I'm thinking, I'm like, well, if you're going to question maybe whether or not I actually know my material, do you even really want me here?

Even though Gabriel knows he would be an asset to his community and school, he still believes that being questioned about his mathematical credibility may drive him to question whether or not he wants to be in that school, community, or even the teaching profession.

In addition to those three major factors for retention, all participants mentioned in their interview that they either believed they could provide some extra benefit to their school and community by either being a role model for their minoritized or non-minoritized students or a motivator of minoritized students due to their minoritized teacher status. Il-seong expounds on this idea in his interview as well as his identity as a "half minority teacher,"

> I still feel like I'm a half minority teacher, so yeah, definitely. I definitely feel like I can bring a lot to the table right now. First of all, I know a second language, so that's a pretty good factor. And I feel like I just relate to these kids that aren't… that aren't going to be fine on their own, like they have their families, the support, they have friends and stuff. But the students that are in unfortunate situations like at their age. I think I can personally connect with the students and be able to understand and tell them, like, hey, is anything I can help you with? Is there like what's going on at home? Or like if they want to tell me about it? I feel like I can really relate to those kids and maybe just have a little bit more compassion and empathy and just connect to those students as opposed to other teachers. So, students that are from like what are those programs called like where students from foreign countries? Yeah, exchange programs. But I feel like I can maybe exchange school stories from those students as well. So, I think I can make a difference.

This was just one example of how a participant thought they could contribute to their future communities and schools. Every participant in the study stated they would add an extra benefit due to their minoritized status or due to their experiences as a minoritized individual.

Tiana and Peter who grew up in a homogenous Black and Latinx neighborhood emphasized the importance of fighting the injustices of unequitable resources dependent on the neighborhood they lived in. They wanted a more equitable distribution of resources- textbooks, classroom supplies, technology, as well as great teachers. Peter stated in his interview:

> Yeah, absolutely. I think there are a lot of things that I as a minority teacher could provide, because outside of school. You do have students, they're like, okay, since he looks like me, you know I can do that too. Or since he did it and he's like me, I can maybe do that too. And basically, that's what I want to show you, because partly I didn't have that until I got to the eighth grade, that was when I had my first black male teacher. So, with that, it's like, okay, he's a teacher. Maybe I could possibly do the same thing and tell them and be successful, and because he was a great teacher. And some of the values that I have right now with me, I definitely think they help the school. If you're an efficient, effective teacher, and you help your students understand what they're doing. That would definitely improve test scores, and if you improve test scores, I'm pretty sure you would probably get more funding for better technology, better foods and stuff like that, that will help equity in that school in the long run.

Peter hit on equity in two ways: he wanted to be a Black, male mathematics teacher to be a model for those who may not have considered teaching before, and he wanted to help students mastering the materials so they can improve standardized tests scores that may affect funding.

Summary

This section examines resonance across the narratives. Similar themes across different races, educational experiences, and barriers were compared while also identifying significant differences (Clandinin et. al., 2012). The major themes discussed in this section are: minoritized identity with ideas of assimilation for some; supporters and resistors to education and pursing teaching; individual aha moments from our participants on when they decided to become teachers; the impact of their TEPs; their voice in terms of being heard in their TEP as well as in their future careers; and finally, minoritized mathematics teacher retention. There were interesting differences amongst immigrants and naturally born residents between my participants, especially in terms of assimilating to the American culture. In addition, the major barrier of the difficulty of their mathematics or engineering major to finish their TEPs showed stark differences between the Asian and non-Asian participants. Lastly, all participants believed they could provide additional support for their students, schools, and communities due to their experiences as a minoritized individual seeking mathematics teacher certification.

Chapter 5

DISCUSSION AND IMPLICATIONS

The primary purpose of this research was to gain insight into how to recruit and retain minoritized mathematics teachers learning from the narratives and experiences of minoritized PSTs. The findings will use commonalities and important differences between participants who self-identified as different races to develop plans for universities, colleges, and schools to diversify their mathematics PST cohorts and teaching positions. The underlying premise is that minoritized PSTs experience shared, yet different life experiences that drive their interests to pursue mathematics teaching in secondary education. By understanding the narratives of minoritized PSTs and finding similarities and differences between races or ethnicities, researchers and practitioners can develop more succinct plans to diversify their teaching cohorts and faculty. Moreover, by implementing a narrative inquiry approach based on the works of Clandinin and Connelly (2000) and Clandinin and Huber (2010), I remained, for the duration of the data gathering period, in the midst of the narrative, co-experiencing and co-authoring the story of inquiry and prompting the stories of the participants as we lived together throughout the study either as students in TEP or within STEM teacher education internships.

To clarify again, I identify myself as a minoritized teacher of color who pursued teaching mathematics after returning back to college to participate in teacher education. At the outset of the study, I believed my experiences would be similar to some of the participants. I intended to gain an understanding into how their personal narratives cultivated an interest in teaching secondary mathematics and whether there would be clear commonalities and differences amongst the participants.

The analysis for this study focused on two major research questions: (a) how do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?; and (b) what reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs? Within the first major research question, I aimed to also answer three secondary questions. (1) Does an identity as a minoritized individual based on race and ethnicity affect one's pursuit of mathematics education? (2) How has the teacher educator program aided or hindered one's pursuit to become a mathematics educator? (3) What are the similarities and differences in experiences among different races and ethnicities that are pursuing mathematics teacher education? Likewise, within the second major research question, I aimed to answer two more secondary questions. (4) What are barriers for minoritized preservice mathematics teachers to remain in teacher educator programs? (5) What do you believe are the most important factors for minoritized mathematics teachers to continue teaching mathematics for a long career (over 10 years)?

The next section will offer responses to the primary and secondary research questions based on the insights gained through the analysis of one-on-one interviews and one focus group interview. Following this, the next section will focus on implications for practice and research in mathematics teacher education. Next, I will address my reflection on my own learning for practice and research in mathematics teacher education. Finally, chapter 5 will conclude with my final thoughts concerning the study.

Research Question 1

How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?

(1) Does an identity as a minoritized individual based on race and ethnicity affect one's pursuit of mathematics education?

Identity is a complex construct defined as individuals' participation in and across activities in which they use certain resources to negotiate and make sense of themselves in relation to these activities (Cobb et. al., 2009). Minoritized individuals often have difficulty searching for their identities as they traverse becoming Americanized for immigrants or defining oneself while debunking racial stereotypes for United States-born individuals. Minoritized PSTs, especially the individuals who immigrated, often struggled to find their identity in the United States, as reflected in the experiences of the participants of this study. Even United States born residents struggled with their identities, in particular, when they had a multi-racial background. All but one participant, strongly agreed with their self-identities as minoritized individuals. One participant, Il-seong, had a unique interpretation of his identity that was very different from the other participants. Il-seong believed he was only somewhat minoritized now because he believed he was more American than Korean after spending the majority of his life in the United States after having immigrated from South Korea. From this point about the participants negotiating identities as minoritized individuals, I move to discussing the different ways the participants' minoritized identities affected their pursuit of mathematics education.

The participants' experiences negotiating their minoritized identities seemed to impact their decisions to pursue mathematics teacher education. One such experience was that of some participants' efforts to address a presumed need to assimilate to the American culture. This is illustrated in the participants who self-identified as Asian American. It is important to note the differences within the ethnicities and nationalities within one labeled race as it would be unequitable to assume all members of the group are the same. For example, the race of Asian has

incredible diversity amongst those labeled as Asian. The Asian population is the largest population in the world ranging from mainland China, India, and the Pacific Islanders to name a few. The study participants who self-identified as Asian American were from China, Japan, and South Korea. Individuals from a host of countries included in Northeast Asia, Southeast Asia, and the Pacific Islands are often lumped into one homogenous category of Asian when they historically have lived in different circumstances. In America's past, northeast Asian as well as Indian immigrants were allowed to enter the country if they could provide benefits to White society (Nguyen, 2020). So, these immigrants were often doctors, scientists, and engineers with lots of education from their home country. For this reason, Asian immigrants are often labeled the model minority when in fact the largest gaps in economics, such as wages, and in education are the largest when compared to other ethnicities within the socially constructed idea of race (Ramakrishnan & Ahmad, 2015). The immigration stories of rest of the Asian population in American is often ignored. Many immigrants from Southeast Asia and the Pacific Islands fled their countries due to social and political turmoil. They did not necessarily come with the same educational background and skillsets as some of the Northeast Asians entering the country. Northeast Asian decedents are often on the higher end with the exception of Filipinos while Southeast Asians and Pacific Islanders often have average salaries below any other racial groups including Black or Latinx (Ramakrishnan & Ahmad, 2015).

Bethany, Chu, and Il-seong's parents all immigrated from Northeast Asia. Although I do not know all of their occupations, they were described as stereotypical strict parents, valuing education, as indicated in the narratives. To this end, all of the Asian American participants excelled in their schools and valued education as a top priority even without the assistance of their parents, with the language barrier seeming to be too much for the parents. All of the Asian

American participants had to work harder without the assistance of their parents' guidance and found different avenues to facilitate their learning. They all described such experiences with overcoming challenges in order to succeed in education as a factor in deciding to become teachers. They described how they would like to share their own experiences of overcoming challenges with students in similar situations. Likewise, the other participants of the study, outside of Bethany, Chu, and Il-seong, also had parents who valued education, but these remaining participants did not directly equate their experiences as impacting their decisions to teach mathematics.

A second experience was actually an anticipated one. Minoritized identity was a deterrent or barrier to continue to pursue becoming a mathematics teacher for two participants. Sydney and Gabriel expressed concerns about their professional credibility. They did not necessarily believe that they were not qualified, but rather how their prospective students and/or parents would perceive their ability to teach and do mathematics. Both expressed that because of their race and/or skin color that they expected to experience some resistance from the parents of their future students. Gabriel explicitly referenced a book written by an African American professor who had to consistently defend his credibility to stakeholders within his university. Gabriel and Sydney feared that this could be a barrier when they start teaching although they had not actually experienced this situation as PSTs. Some participants used their different experiences to inform the kind of teacher they would want to be and feel that they should be due to those experiences.

Tiana, Peter, and Il-seong all reference an experience(s) as a minoritized student that guided what kind of teacher they would like to become and the rationale for their thoughts. Regarding Tiana, she did not limit herself to just becoming an impactful teacher, but rather, Tiana hoped to eventually open up her own charter school focused on minoritized student

success just like the one she attended in high school. Tiana was convinced that minoritized students need a more specified curriculum that reveals some of the disadvantages placed on them from years and years of an inequitable system. As Tiana revealed in her interview, she stated:

> I personally wanted to just teach for a few years, but I also want to open up my own charter school. And I remember having a debate with my friends actually. My friends were saying it just harder, so why not just go to a public school, but I remember just the experience I had in a charter school. And I feel like it was a lot of discipline and professionalism that I've learned in my school because it was a charter school. And I remember in ninth grade, I was going home and complaining to my parents, I got to transfer to the public school, like I'm getting too much homework. We were doing SLANT at my school, which forces students [to stay disciplined]. SLANT, it was different, like if you didn't sit in SLANT, you got a demerit. And we used to call it a jail system, but it was actually like... after I graduated, like looking back and it prepared me.

Tiana believed that not only her teachers, but the charter school itself impacted her decision to pursue teaching as well as a future goal of opening up her own charter school focused on minoritized student success.

In the second example, Peter saw a lack of resources and opportunities based on his identity and neighborhood schools. Peter used the discrepancy as more reason to pursue mathematics education. He wanted to make changes in how education, specifically mathematics education, is restricted in communities of color. As stated previously, Peter explained why he would want to become a teacher:

> If you're an efficient, effective teacher, and you help your students understand what they're doing. That would definitely improve test scores, and if you improve test scores,

> I'm pretty sure you would probably get more funding for better technology, better foods and stuff like that, that would help the school in a long run.

After Peter realized that his school experience seemed to lack the resources and advantages that some of his peers in his university experienced, he was even more inspired to consider teaching as his backup plan to becoming an engineer.

The last example shows what type of teacher Il-seong wants to be in the future based on his experiences with teachers in Korea and the United States. Il-seong remembered teachers in Korea focused only on results and not caring about the individual student. Similarly, his parents were not loving, empathetic parents but rather parents who lead with brute force. Therefore, interacting with his caring and understanding American teachers, he fell in love with the U. S. teaching profession. U. S. teachers provided the warmth and love he was missing at home from his family. Il-seong wanted to be a warm presence for students with a similar story. Through his experience with U. S. teachers, he pursued teaching with the vision of who he would be as a future teacher. In his interview he stated:

> That's one of the reasons why I want to become a teacher too. It's because of those teachers that I experienced where, like, man, I love having this kind of relationship with them. Like they really want to help me out. It really helped me out growing up, having a kind of like second parent figure, I guess.

Il-seong attributed his interactions with teachers as a minoritized individual to his growth as a person. He wanted to be a second parent figure for those individuals who might have similar home life situations in which parents showed very little emotions with each other as well as with their children.

Beyond the resonant narrative threads, individual participants mentioned how their identity was uniquely positioning them to pursue mathematics teacher education in terms of equipping them to pursue goals stemming from their unique life experiences. Starting with participant one, Sydney, believed her experiences with racism would equip her to address racist issues when they inevitably arose for her as a teacher. In addition, Sydney believed her minoritized friend groups both supported and deterred her pursuit for higher education.

Participant two, Chu, expressed concerns about being the token minoritized teacher in her school. She did not want to be expected to deal with all non-White race issues just because of her identity as a Chinese immigrant. Chu mentioned that her identity could be a motivator for her future minoritized students who might be immigrants who do not know any English. In this way, she believed her experience was not unique to her and that she could be an ally for students in finding their own identity coming from a different culture, country, and language.

Participant three, Gabriel, found himself working with a local Latinx organization teaching English to adults as part of an assignment during his community college experience. Gabriel enjoyed helping out those who may have looked similar to the way he looked and felt a sense of pride helping those who were trying to learn the English language. As mentioned previously, this was a major shift in how he had originally perceived those who could not speak English and looked similar to the way he looked. In addition to that experience, Gabriel volunteered at a small, private school with a few minoritized students and loved hearing a student tell him that you are a teacher and “you are Brown like me.” That comment made him think of his nieces and nephews who are also Latinx students. He wanted to be a role model for Latinx students, but specifically, he wanted to be an example for students to see a Mexican American teacher succeeding in a STEM field, which might be uncommon for some students

who look like Gabriel. These experiences as a minoritized individual solidified his decision to become a mathematics teacher in order to make this kind of impact.

Participant four, Bethany, had a very unique experience living in Japan and attending diverse international private schools as well as homogenous Japanese public schools. Moving to the United States and living in a predominately White bubble, Bethany recalls having to justify reasons for still holding on to some Japanese customs and events to her peers and sometimes teachers. Bethany conveyed her wish to live in a community that would embrace her diversity rather than scold her for not fitting into the mold expected of her. It appeared that for these various reasons and a culmination of her experiences thus far, Bethany emphasized the importance of teachers being educated about diverse cultures and promoting diversity, not perpetuating the homogenous, majority culture.

Participant five, Tiana, lived in a homogenous, Black neighborhood most of her life. She was used to seeing teachers from the same background. She recounted how the neighborhood schools she experienced lacked resources which motivated her to consider opening in the future a charter school focused on improving minoritized student success. Tiana believed she has had opportunities provided to her because of her race, but conversely, some limitations arose because of her race as well. Tiana used the lack of resources and opportunities as motivators to continue to push through and succeed within mathematics and, consequently, mathematics teacher education. Tiana believed she would be an asset to her new school and community based on her experiences growing up as an minoritized individual in a homogenous, Black neighborhood.

Minoritized identity clearly impacted the participants' decisions to pursue mathematics secondary teaching. Beyond the resonant threads, the participants' individual experiences were unique and personally meaningful to them in their own ways. At the same time, identity was also

a restriction for some of our participants' experiences with voice within their TEP. The next section will further discuss how TEP benefited or detracted from the participants' pursuit to become a mathematics teacher.

(2) How has the teacher educator program aided or hindered one's pursuit to become a mathematics educator?

TEPs are vital to the success of PSTs. Without guidance and proper instruction, novice teachers can find themselves struggling to survive in their first years of teaching. All of the participants in the study agreed that their TEP focused on creating, what many of them termed, general teachers versus minoritized teachers. For example, Sydney, Chu, and Bethany explicitly commented on how the program was more focused on how to teach minoritized students rather than how minoritized teachers should teach in different settings and how they might experience teaching. Six out of the seven participants had experiences with the same TEP. This TEP focused on mathematics and sciences specifically as the TEP was established to increase the number of STEM teachers in the local community and regionally. Four of the six participants from this same TEP all agreed that the positive support from peers, mentors, and professors was the most important take away from their experiences with their TEP. Not to be discounted, the significant amount of namely secondary school classroom experience early on in the TEP was also raised as a strength by five out of the six participants who were from the same TEP.

The participants for the most part did not bring up barriers created by the TEP. However, they did note areas of growth related to the field experience component. For example, Sydney wished there were even more classroom experiences in secondary schools so she could solidify which student demographic she would choose to teach. Likewise, Il-seong had a critique about how the classroom experiences in secondary schools were too far apart in terms of scheduling

within the TEP and that he felt more like a substitute teacher rather than a student teacher learning how to teach. He commented that it would be extremely difficult to coordinate changes to the field placement experiences since PSTs' schedules as well as mentor teacher schedules are extremely difficult to pair together in the first place.

Additionally, the three African American participants all mentioned the lack of diversity within the TEP as well as in the university as a whole. All three participants described feeling as if sharing their voice in the TEP classroom was a concern. For example, Sydney first brought up that she felt uncomfortable speaking about race relations in the TEP classes as she did not want to speak for all African Americans which might be an interpretation since she was often the only Black student in her TEP classes. Tiana mentioned how initially she did not think the TEP was right for her because she was surrounded by mostly all White students who looked different from her and had different past experiences in school compared to hers. She did not want to speak up in TEP classes because she was afraid of how her classmates would react to her comments.

Offering a different perspective, a number of participants pointed out the supportive nature of the TEP. For example, Peter commented how he appreciated how his peers in the TEP valued everyone's thoughts and opinions and did not think his race played a role in group work as part of classes in the TEP. According to Peter, his TEP peers all trusted one another to complete their own portion of the work. He also noted that it was a good feeling to know that he would not be judged by others in the TEP because of the color of his skin. As a second example, Chu was another participant who spoke about her voice within the TEP. She said that her peers and professors encouraged her to share different Chinese strategies and methods she would bring to the table when discussing how to solve mathematics problems in class, as well as science

problems. Moreover, Chu and Bethany commented about how their TEP embraces the diversity students, methods, and strategies.

Gabriel's experiences with his TEP also offered a picture of support. Although Gabriel's TEP was different from that of the other participants, Gabriel commented on specific professors who had help him in many different ways. Two moments of support resonated with Gabriel, and both have to do with his financial hardships. Two different professors in his TEP went above and beyond by purchasing textbooks for Gabriel to borrow instead of requiring him to buy one and paying for Gabriel's testing fee for one of the teacher certification requirements. Gabriel noted that this support was also evident in his time as a student at a local community college where he was encouraged to pursue mathematics as a major.

All of the participants in the study agreed that their TEP focused on creating, what many of them termed, general teachers versus minoritized teachers. Four of the six participants from the same TEP all agreed that the positive support from peers, mentors, and professors was the most important take away from their experience with their TEP. Not to be discounted, the significant amount of secondary school classroom experience, especially early on in the TEP, was also raised as a strength by five of the six participants from the same TEP. Additionally, the three African American participants all mentioned the lack of diversity within the TEP as well as in the university as a whole. Gabriel's experiences with his TEP also offered a picture of support. Although Gabriel's TEP was different from that of the other participants, Gabriel commented on specific professors who helped him with financial hardships. The next section will focus on the similarities and differences in experiences among different races and ethnicities.

(3) What are the similarities and differences in experiences among different races and ethnicities that are pursuing mathematics teacher education?

There were similarities and differences among all races of the PSTs who participated in the study. Starting with similarities, the one that was the most prominent is how each participant experienced an aha moment that clicked in their mind that "yes, I should be a teacher" and a mathematics teacher at that. Six of the seven participants recalled a specific instance in which a high school teacher or an event in high school triggered a curiosity and passion to want to become a mathematics teacher. These aha moments varied and included having a teacher push a student out of his/her comfort zone to lead a portion of class instruction, encouraging another student to pursue mathematics, helping peers by tutoring them, or conversely, having a teacher not believe in you. In Gabriel's case, he experienced a teacher who did not believe in his mathematical ability and placed him in a below grade-level mathematics class without clear rationale. This sparked a motivation in Gabriel to pursue mathematics to the highest degree even though mathematics did not come easily for him. Similarly, Chu's aha moment came in college when she decided pharmacy was not for her. She recalled how in high school, even with her "broken English," as she stated, she could assist her peers in mathematics because mathematics is a "universal language."

A second similarity was the support all the participants received from either teachers or professors in secondary school, community college, or at the university level. A third similarity across all participants was the verbal support they received from their family members, especially their parents. All participants stated that their parents valued education and encouraged them to do well. However, all participants also commented on the fact that verbal support for the most part was the extent of their parents' support. This lack of support appeared to be more related to the parents' language barrier or work schedules. All participants

commented on how their parents always provided all they ever needed to survive, but not necessarily all the advantages some of their more affluent peers in college experienced.

A fourth similarity identified across participants self-identifying as Asian, Latinx, or African American (but not necessarily all participants) was their struggle to find their identity or a sense of who they are. Even the participants who were born in the United States struggled with their identity like immigrant participants did but in different ways. For example, Sydney was born in the United States, but her mother had a mixed-race background and identified as African American and Mexican. Sydney decided to describe herself as African American since it was easier to explain to other people than to say she was mixed-race. Gabriel's identity continued to adapt even to the time of the interview. As a young student he looked down on the Latinx community because they could not speak English, but at the same time, he did not feel accepted by the American community. Gabriel expressed how he had recently felt more comfortable discovering more about his heritage. Reflecting a shift as well, Il-seong very much felt like an immigrant and a minoritized individual growing up, but now feels like he is not really minoritized since he regards himself as having assimilated well to American culture. The four major similarities found in the study included: aha moments; support from teachers in all levels of education; parental valuation of education and support; and finally, the struggle with finding their place sense of who they are in American society. However, all similarities did not occur for all my participants; some differences were found between participants of differing races.

The participants' narratives reflected differences across self-identified racial groups as well. The Asian American participants found that when they moved to the United States from their respective places of birth in Asia, they were met with kind peers and teachers. This was in contrast to the only Latinx participant who was not met with same kindness as the Asian

participants since he dealt with racism and bullying when he first arrived in the country. Although, all four participants immigrated to the United States, the Asian American participants recalled positive experiences while the Latinx participant experienced a situation where he questioned his identity and struggled to find a place of comfort, familiarity, and a sense of belonging. Gabriel was constantly traversing between his American persona as well as his Mexican heritage, and only recently has he been able to accept who he is and who he has become – a Mexican American. It seems that the differences I have discussed are not as prominent as the similarities across participants reflecting different racial groups.

In terms of the African American participants, they were initially apprehensive about speaking up in class to offer their opinions about education or race issues, but they eventually realized that the TEP was a safe space and that their opinions and thoughts were valued. In addition to feeling that their voice was being restricted, all three American participants mentioned the difficulty of their chosen mathematics or engineering major as a hindrance or barrier. Gabriel also commented on the difficulty of a mathematics major. In addition, commonalities among the African American participants were identified when they shared thoughts of the lack of diversity in the TEP. Related to this topic, Sydney was more prepared for the homogenous classrooms at her university due to her past educational experiences, but Tiana and Peter both came from a different type of homogenous neighborhood where almost everyone looked similar to them. It was a difficult transition initially, as they shared. Likewise, Tiana and Peter both were interested in fighting injustices and the lack of equitable resources since they both came from a similar community where there was a lack of resources. The next section will continue to look at similarities and differences but in the context of barriers to becoming a teacher and retaining that position for a long career.

Research Question 2

What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs?

(4) What are barriers for minoritized preservice mathematics teachers to remain in teacher educator programs?

As mentioned above, the African American and Latinx participants all mentioned the difficulty of their mathematics or engineering major and regarded the major as a barrier to their completion of the program in becoming a teacher. For example, teaching was Peter's back up plan with engineering as his first plan. His advisors told him before he committed to take education courses that not many students complete the engineering major in addition to the STEM teacher education minor to become a teacher. Peter spoke about the difficulty he experienced in prioritizing his engineering classes more than his education classes. Related to a mathematics major, both Sydney and Tiana were interested in teaching Algebra in high school and did not think majoring in mathematics was necessary to teach those topics in middle or high school. In addition to the difficulty of the majors, two participants described the difficulty in having an extra semester of college beyond the four years in order to complete program requirements. Bethany was looking to graduate early as she was taking summer school classes in addition to both community college and university classes at the same time. Tiana was worried about the financial burden another semester of schooling would have on her family income. The next barrier I will discuss was only mentioned by one participant but there is a possibility that other minoritized PSTs might feel similarly.

One participant, Sydney, expressed her concern that her voice as a minoritized teacher would be disregarded due to her race. Recall that Sydney commented that did not want to use her

voice to speak about racial tensions but wanted her voice to be heard about classroom issues, emphasizing that she wanted her future administration to listen to her opinions and thoughts. There is definitely a difference between the two situations related to voice, but the requirement of her voice being heard was treated as a necessity in discussing teacher retention. In addition to her voice being heard, Sydney as well as Gabriel worried about how others would perceive the credibility of Latinx and Black minoritized teachers. They both commented on how they had read or heard about teachers constantly having to defend themselves and their ability to teach and do mathematics. They feared that they must be prepared to address such issues in the future. The barriers of finishing a difficult major of mathematics or engineering, the fight for minoritized teachers voices to heard and valued, and the fear of Latinx and Black mathematics teachers' credibility being unjustly challenged also connected to the participants' thoughts about teacher retention. The next section will examine the fifth secondary research question listed below and related to long-term teacher retention.

(5) What do you believe are the most important factors for minoritized mathematics teachers to continue teaching mathematics for a long career (over 10 years)?

It is often difficult for PSTs to think about what important factors they need in order to stay retained in the teaching profession since this is anticipating for the future. Not all the participants had specific answers to these questions, but some seemed familiar with possible issues. The number one factor that would keep the PSTs retained as a mathematics teacher was increasing teacher pay, as many of their parents were resistant to their pursuing mathematics teacher education due to the low salaries when compared to other STEM-focused jobs. The participants all knew that increasing salaries would not be easily accomplished so they shifted to other ideas of which they had heard about. The next common factor for teacher retention

mentioned by three of the seven participants was the need for support for new teachers from other teachers and administrators and there is no indication, that I can see that the four that didn't focus on this would concur. Support from other teachers could be in the form of sharing lesson plans and strategies for teaching while support from administration was more aligned with classroom management and discipline as well as access to effective and practical professional development.

Not to be minimized but one participant expressed concerns about having her minoritized teacher voice heard and valued, as conveyed by Sydney's interview. In addition, Sydney and Gabriel both mentioned that they did not want to experience criticism about their ability to teach mathematics from parents of their students, and they expected this might be the case based on what they had read or heard about through other minoritized teachers.

The next common factor for teacher retention was student success as gained through insights gleaned from the narratives. Two participants mentioned how seeing their students succeed rather than fail would be a huge factor for staying in the teaching profession. One participant had already finished her TEP but had yet entered the workforce due to the Coronavirus. She was critical of her teaching practices and almost decided to quit the profession after her student teaching internship. She came to the conclusion that student success could also be student growth in mathematics. This reflection altered her decision to remain in the profession rather than quitting due to her students' poor scores on quizzes and tests. She understood that growing students in mathematics may not be reflected solely in students' grades.

The final aspect that would contribute to teacher retention is the participants' impact as future teachers on their community and school. Six out of seven participants explicitly mentioned how they could be an asset to their communities and schools. The responses from participants

ranged from being a motivator to minoritized as well as all types of students to seeing themselves as role models. Most participants believed they could resonate with and make a difference to K-12 students who are dealing with similar situations and showing them that success is possible. The participants' interviews indicated six possible factors for minoritized teacher retention. Increasing teacher pay, new teacher mentoring and support, valued voice, minoritized mathematics teacher credibility, student success, and impact on their future schools were all important factors to the participants of the study. Following this discussion of responses to the research questions, I now turn to the next section that aims to discuss the implications for practice and research based on the insighted gained from the interviews.

Implications for Practice

The purpose of this study was to develop plans for universities, colleges, and schools to diversify their mathematics PST cohorts and teaching positions. This section examines how the analysis and insights gained provided implications on how to practically complete this task. This section will first discuss how TEPs can recruit more teachers in general and then focus on how to retain minoritized mathematics teachers. This section will then shift to how current teachers can act as the best recruiters for all teachers, especially minoritized individuals.

The passion for teaching can be learned and embraced even after original career and/or family plans have changed. This occurrence should encourage TEPs to actively seek out teacher candidates outside of the normal context of teacher PST recruitment which usually relies on academic advisors to promote their programs. In the case of our participants, Chu changed her major from pre-pharmacy to mathematics in order to teach in secondary schools after reflecting on whether she valued becoming pharmacist. Gabriel is a nontraditional student who was reminded of his passion to teach mathematics only after his community college professor

encouraged him to think about teaching mathematics and provided him with an opportunity to apply for an introduction to STEM teaching internship. TEPs, academic advisors, and mathematics departments should work together in offering information on how to pursue teaching during and after earning their mathematics or mathematics-related undergraduate or associate degree.

In addition, TEPs should also consider explicitly delivering information on how minoritized teachers may have different experiences as teachers compared to their White counterparts. This type of support can be in the form of a section of coursework within a class, a whole class dedicated to challenges minoritized teachers may face, and offering independent studies in which all interested PSTs, especially minoritized, can elect to enroll. Most of the participants, other than Sydney and Gabriel, never considered how teaching might be unique for them as minoritized individuals. Sydney and Gabriel reflected on how the color of their skin could raise questions for parents who did not believe teachers of color can teach mathematics with fidelity and rigor. By asking difficult questions and getting ahead of potential issues, delivering coursework on how to be a minoritized teacher could prepare potential PSTs with strategies they may have never considered unless put into that particular situation. The more preparation individuals in TEP programs have of potential issues, the more likely they can manage situations and remain in teaching. Some suggestions would be to have situations where PSTs must role play uncomfortable situations. During this political climate of racial unrest, researcher Early (2019) as well as others urge teacher educators to integrate the “Ouch and Educate.” Ouch and Educate means individuals have the permission to speak up if one feels uncomfortable or if comments are offensive. The goal would be to help others to see your perspective and then take the time to listen for understanding.

Along with, Ouch and Educate, the major recommendation would be for TEPs to integrate more culturally relevant education (CRE) principles into their curriculum. Culturally relevant teaching focuses on empowering students intellectually, socially, emotionally, and politically by using cultural references to divulge knowledge, skills, and attitudes (Ladson-Billings, 1994). CRE aims to leverage students' strengths and community resources and in turn provide academic success for students from historically underrepresented groups in mathematics and science education (Gresalfi & Cobb, 2006; Ladson-Billings, 1997). Based on Chu's interview, TEPs should not only discuss CRE principles but explicitly instruct PSTs on how to concretely implement those strategies into daily lesson planning. Most individuals believe integrating students' strengths and resources is a great way to motivate students, but if a teacher does not know how to practically implement those strategies into the curriculum, CRE has lost its power. My suggestion would be to add a new section to the various lesson plan templates where PSTs must include CRE principles into their lesson planning when going on field experiences in real classrooms. This suggestion will not be effective unless TEP stakeholders such as professors do not implement CRE principles into their own university level lesson plans and pedagogy. Professors themselves can benefit from modeling how to implement CRE principles in a concrete way for PSTs to grasp the effectiveness of its purpose.

Another suggestion would be to bring in a panel of minoritized teachers, where PSTs can ask questions as well as hear individual minoritized teacher stories. However, the recruitment of mathematics teachers does not end at the university level. Current teachers in K-12 settings can serve as frontline recruiters of future mathematics teachers. Therefore, TEPs should encourage PSTs to look for potential teachers when they are in their own real classrooms and encourage

students to become mathematics teachers. Clearly, teachers are one of the most effective recruiters to the mathematics teaching profession.

Current teachers can be the first line of recruiting more teachers, namely minoritized teachers given that minoritized individuals may have never considered teaching as an option since they quite possibly have never encountered a minoritized teacher in mathematics classes. Most, if not all, participants were heavily influenced by one or more teachers in their lives. In addition, participants recalled an aha moment with one or more of said teachers. In order for current teachers to actively recruit their current and past students, they must feel the profession is worth promoting. I can remember an administrator asking the mathematics department to actively look for potential mathematics teachers in their students, but the department head at the time responded, “how can I ask students to become teachers when, I, myself, am not convinced this is a sustainable job.” During this time, teacher morale was at an all-time low due to various reasons. Some of those reasons were the stress of standardized tests in mathematics, the change to common core mathematics, and inadequate support from administration on classroom management and interactions with parents. For teachers to actively recruit their past and present students, they must feel valued and appreciated so they in turn can honestly recommend the profession to their students. In addition, teachers need to understand the impact they have on students outside of the context of standardized test scores. Inservice teachers as well as administrators can facilitate this understanding by explicitly acknowledging their colleagues on their impact outside of just presenting the curriculum.

This section offers key implications for practice ranging from recruiting outside of the typically teacher educator pipelines to TEPs explicitly addressing the needs and challenges of minoritized teachers. In addition, TEPs can incorporate practical modelling of CRE principles

into daily lesson planning while creating opportunities to engage in Ouch and Educate. Likewise, TEPs can create opportunities for current minoritized in-service teachers to speak to PSTs in panels where stories can be shared and tough, revealing questions can be asked. Lastly, in-service teachers should actively recruit potential teachers by letting them know of their potential as well as providing opportunities for students to teach one another. From implications for practice, the following section will examine implications for future research.

Implications for Research

Researchers of mathematics education can contribute to much-needed research by questioning what it takes to be a minoritized mathematics teacher in secondary education for each race and the different cultures within said race. I believe each race and culture brings in different values, ideas, and strategies that could be used in our classrooms. We can learn from each other to build succinct plans on how to prepare specific minoritized PSTs for urban, rural, and suburban schools. Not only can one differentiate for each type of surrounding, one can also attempt to prepare minoritized individuals in how to serve as role models for minoritized students, as well as all students.

Often, the myth of the model minority is stated in the media as well as in academia. The Asian population in America is often referred to as the model minority class. They can be described as students who keep their heads down and work hard. The myth of the American Dream is falsely intertwined with Asians in America and geared towards advancing the White supremacy agenda. By announcing Asian Americans as an example of the American dream, it falsely claims that all Asian American are the same and therefore can be grouped together (Lui, 1998). Asian Americans and Asians living in America have the largest wage gap between one ethnicity over another (Ramakrishnan & Ahmad, 2015). For example, Chinese, Japanese,

Korean, and Filipino average considerably larger yearly wages than Southeast Asian and Pacific islanders. This is similar to Gutiérrez's (2008) point in her research about gap gazing. It is critical to examine diversity within racial groups and to learn from participants' perspectives rather than only looking at statistics. I would like to see the Asian stereotype of all Asians are good at mathematics to be extinguished as it creates negative images of young Asian students when they are not naturally gifted in mathematics.

This study was incredibly restricted by the number of participants and different races represented. Future research should aim to broaden the scope of my research and find more diverse participants to further understand the minoritized teacher shortage. As mentioned previously, the proportion of minoritized students compared to minoritized teachers is different by about thirty percent in the United States. Mathematics researchers can make significant contributions by further understanding minoritized student needs and how to make sure teachers are representing the growing student population in the United States. In addition, future research should consider within group diversity beyond broad racial groups. As the example with Asian Americans shown, there is diversity within this group. Research should seriously continue to consider the participants' perspective as well.

Likewise, more studies that examine when and how teachers became interested in mathematics teaching are critical. Through the analysis of participants interviews, teachers made a huge difference. With a larger sample size, what further can be learned other than to validate qualitative studies? Most participants found their aha moment in high school. Would this common situation hold with a larger sample size? In contrast to the study, research that examines TEPs that have a specific focus on CRE would be compelling to examine because the PSTs in

the current study participated in TEPs that did not. A comparative research study could shed light on the successes, failures, and improvement for TEPs focusing on CRE principles.

Additionally, current PSTs enrollment in TEPs have been declining in recent years due to state-level restrictions on teacher certification as well as the current situation of online learning due to the pandemic (Goldberg, 2021). Current requirements such as passing Praxis content exams and edTPA could be re-evaluated to be more inclusive and less restrictive in earning teacher certification. Rigorous alternative forms of certification could be offered in the form of micro-credentials where prospective teachers can slowly earn their certification while transferring from existing occupations to teaching. The last implication for research is to investigate additional recruitment efforts beyond the current scope of TEPs. More research on recruiting efforts using narrative inquiry on a larger scale could provide more commonalities and differences amongst all participating PSTs. In the next section, I will reflect on my own learning through this doctoral and dissertation process.

Reflection on My Learning

From completing this dissertation on recruiting and retaining minoritized PSTs during the current political and social climate of racial inequality, I have come to realize my experiences are similar, yet incredibly different, from other minoritized individuals, as reflected in the experiences of the participants of this study. It is exceedingly difficult to generalize anything about a socially constructed race in the United States. The lack of individuality placed on categorizing one as African American or Asian American, for example, is actually dividing members within each race by assuming they are the same. To group individuals based on the fact that their ancestors immigrated from a certain continent minimizes the individualism and nuances they could bring to enrich our society and educational experiences. Even Northeastern

Asians have been known to look down upon Southeastern Asians for the stereotype of being a lower-class Asian.

Similar to my participants, I despised speaking about racial tensions in the United States because I was often the only minoritized individual or one of two individuals in my TEP or other classes. I did not want to speak or to be called out, in general, about my experiences as a minoritized individual because I did not want to speak for all minoritized individuals. I knew as a Korean American, I had different privileges offered to me that my African American and Latinx peers did not have. Many of the Asian stereotypes are seen as positives instead of negatives such as Asians are good at mathematics, although there is a plethora of negative stereotypes as well. But through this research I understand that we must first experience the "ouch" and uncomfortableness to be able to learn and grow as a society. Minoritized individuals should not be tasked to teach White individuals how to empathize with their situations and experiences but rather there must be joint agreements from all parties involved towards the same goal for real change to occur. Locating powerful allies for equity and change moving beyond Whiteness is a difficult task as years and years of systemic racism has plagued our society on all levels. But without the support of White allies, we cannot collectively move forward and make real strides in providing equity and representation in our teacher workforce in order to provide all students with the best opportunity to learn and grow as individuals in the United States.

Final Thoughts

My journey to becoming a mathematics teacher was non-traditional and very similar yet different from the participants in my study. I can only remember seeing one Asian American teacher in my lifetime in primary and secondary schools. I remember having a handful of Black teachers and one Latinx teacher who taught Spanish. I can recall all of my mathematics teachers

being White females with the exception of my AP Statistics teacher who was really the computer science teacher who was asked to teach the course without any knowledge of statistics. He was a White male. Needless to say, I never considered teaching as a profession. I certainly did not think I would want to become a mathematics teacher as I did not even enjoy tutoring my friends.

I started college at a four-year university where I graduated with a degree in business administration. I was satisfying my parents' hope for their children to have stable yet financially lucrative jobs. I focused on business administration and accounting. Similar to Gabriel, I thought I would enjoy accounting as I helped out my parents in their business as well. In the same way as Chu, I thought having a secure job would be enough for me. I was wrong; after only one year working as an entry-level accountant, I decided to quit my job and searched for purpose in my life. After pondering different ideas, including an offer by my parents to open up my own store similar to theirs, I had the opportunity to lead a high school senior class bible study. My bible study students were so insightful and full of great ideas, I became drawn to the idea of working with school aged children. I always felt as if I could relate with the younger generation more than the older generation. Coupled with my love to potentially coach soccer and seeing the success of two of my cousins beginning their elementary teaching careers, I was readmitted to my college to pursue teaching mathematics. Similarly to all my participants, my TEP at the time was only focused on creating great mathematics teachers. It also did not have any focus on minoritized teachers. I did not know teaching would be different for me as a minoritized individual.

On the other hand, in contrast to my participants, when I first started teaching, my main goal was not only to necessarily teach mathematics well. I wanted to break the many Asian stereotypes I faced growing up. I actively sought out opportunities to show that I like sports, rap music, and that a personal relationship with my students was more important than any grade on a

mathematics test. I believe I achieved that goal. I did not realize the significance of my capacity as a role model for my students, especially minoritized students. I often felt empathy for my minoritized students and always encouraged them to maintain their own high expectations. In contrast to Sydney and Gabriel's fear of being challenged as a minoritized mathematics teacher, I was never challenged by anyone on my ability to teach mathematics, but I saw many colleagues challenged. I, now, recognize that situation as a privilege not guaranteed to most minoritized mathematics teachers. My suspicion is the Asian stereotype of all Asians are good at mathematics fueled this occurrence. The mathematics department at one time was a revolving door. In my third year of teaching, I was considered one of the veteran mathematics teachers. I was offered positions for which I did not believe I was qualified due to my lack of experience. I often rejected the positions due to my status as a soccer coach at the school. I did not think I had enough time to do all the positions well without sacrificing quality in some respect. I eventually left teaching because I wanted to make a greater impact than I was making as a teacher. My wife periodically reminds me that she valued the fact I was working with young students. She too believed I could make a great impact at the high school level, but I wanted higher pay and more respect as the teaching profession has been minimized by the media and other high-ranking officials, in my experience.

Finally, I sought to end this dissertation with my own narrative comparing and contrasting my experience as a minoritized mathematics teacher with those of my participants. We obviously shared different experiences, but in the end, we used those experiences to grow as teachers. Those experiences shape who we are and who we will become. Our experiences are unique to our own lives but understanding and having empathy for students in similar situations can improve equity in our schools. The impact of a minoritized teacher is not guaranteed to be

more substantial than a White teacher, but the experiences minoritized teachers face growing up can be invaluable to a student searching for his/her own identity and traversing through our complex, inequitable American society.

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APPENDICES

Appendix A

Recruiting Minoritized Mathematics Preservice Teachers with Retention in Mind
Informed Consent Form for Research Study Participation

You are invited to be part of a research study being conducted by Nicholas Kim at the University of Tennessee, Knoxville. You are being invited because you are a minoritized preservice teacher and have participated in the VolsTeach program or events with the East Tennessee STEM Hub. Being in this research is voluntary, and you should only agree if you completely understand the study and want to volunteer to your time to participate in a video recorded online interviews. This form contains information that will help you decide if you want to be part of this research study or not. Please take the time to read it carefully, and if there is anything you don't understand, please ask questions.

Purpose
The purpose of this study is to provide insight into the narratives and experiences of minoritized preservice teachers interested in teaching mathematics, and how that impacts recruitment and retention of those minoritized teachers. I plan to share the results from the study as a part of my dissertation work on recruiting and retaining minoritized mathematics teachers as well as publishing articles and making presentations at conferences. In this study, I am interested in exploring the personal narratives from minoritized preservice teachers in one-on-one individual interviews as well as a focus group interview.

Participation
Your participation in the one-on-one individual interviews should take approximately 45-60 minutes to complete. Data that you provide can give valuable insight to different ways to recruit and retain minoritized mathematics teachers. Your involvement in this project will consist of a one-on-one recorded Zoom Conference Interview with audio and video, in which you will be asked questions regarding your experiences growing up as a minoritized individual that led you to consider pursuing teaching as a career. In addition to the one-on-one interview, you may be selected to voluntarily participate in a focus group interview (60-75 minutes) with other minoritized preservice teachers to talk about your similar and/or diverse experiences. After data has been analyzed, member checking will be required to ensure the accuracy of my analysis.

Benefit
You will not receive any direct benefit from allowing your interview transcripts and video to be used in the research project, but I hope to learn things that will benefit the recruitment and retention of minoritized mathematics teachers to increase diversity.

Risks
The research is considered to be no more than minimal risk, which means there is no more expected risk to you than what you might experience during a typical day. There is the risk of the possible loss of confidentiality, as someone could find out you were in this study or see your study information, but I believe that risk is unlikely because of the procedures we will use to protect your information. You may feel uncomfortable sharing your opinions; however, please know that all responses will be kept confidential, and your responses will in no way affect your status as a teacher. Please answer every question as honestly and detailed as possible.

Confidentiality
If you agree to allow your interview transcriptions and video to be used in the research, I will assign you a pseudonym (fake name) and use that instead of your name on all the materials before I begin analyzing them for the research study. These materials will be stored in a secure location on the UT campus. No information which could identify you will be shared in publications and presentations about this study or databases in which results may be stored. If I wish to include your name, pictures, recordings, or other information that could identify you in publications or presentations, I will ask for separate written permission for this.

Future Research
Your transcribed interviews may be used for future research studies or shared with other researchers for use in future studies without obtaining additional informed consent from you. If this happens, all of your identifiable information will be removed before any future use or sharing with other researchers. All data shared with other researchers will have only pseudonyms replacing your identifiable information.

Contact Information
If you have any questions about this research, please contact me, Nicholas Kim, at nkim2@vols.utk.edu or 615-497-1419. My faculty advisor is Dr. Lynn Hodge, and you can reach her by email at lhodge4@utk.edu. If you have any questions about your rights as a research participant, please contact the Institutional Review Board (IRB) of the University of Tennessee, Knoxville, at utkirb@utk.edu or 865-974-7697. You may also contact the IRB with any problems, complaints or concerns you have about the research study.

Voluntary Participation
It is completely up to you to decide to be in this research study. Even if you decide to be part of the study now, you may change your mind at any time by contacting Nicholas Kim via email or by phone. You will not lose any services, benefits, or rights you would normally have if you choose not to volunteer, or if you change your mind and stop being in the study later. If you do not wish to be in the research, it is not necessary to do anything, as I cannot use your materials without your consent. If you choose to withdraw from the study, it is possible that data collected from you will be kept and continue to be analyzed, unless you notify the researcher to remove or destroy it.

Consent
I have read the above information. I have received a copy of this form. I understand that my participation in this research study includes allowing Nicholas Kim to use my interviews and video recordings for research purposes. I agree to be included in this study.

Participant's Name (printed)_____

Participant's Signature_____ Date_____

Researcher's Name (printed)_____

Researcher's Signature_____Date_____

Consent for use of images
I agree that the video recordings of the interview of me from the interviews may be analyzed for research purposes.

Participant's Signature_____ Date_____

Appendix B

Recruiting Minoritized Mathematics Preservice Teachers with Retention in Mind
Focus Group Informed Consent Form for Research Study Participation

You are invited to be part of a research study being conducted by Nicholas Kim at the University of Tennessee, Knoxville. You are being invited because you are a minoritized preservice teacher and have participated in the VolsTeach program or events with the East Tennessee STEM Hub. Being in this research is voluntary, and you should only agree if you completely understand the study and want to volunteer to your time to participate in a video recorded online interviews. This form contains information that will help you decide if you want to be part of this research study or not. Please take the time to read it carefully, and if there is anything you don't understand, please ask questions.

Purpose
The purpose of this study is to provide insight into the narratives and experiences of minoritized preservice teachers interested in teaching mathematics, and how that impacts recruitment and retention of those minoritized teachers. I plan to share the results from the study as a part of my dissertation work on recruiting and retaining minoritized mathematics teachers as well as publishing articles and making presentations at conferences. In this study, I am interested in exploring the personal narratives from minoritized preservice teachers in one-on-one individual interviews as well as a focus group interview.

Participation
Your participation in the Focus Group interview should take approximately 60-75 minutes to complete. Data that you provide can give valuable insight to different ways to recruit and retain minoritized mathematics teachers. Your involvement in this project will consist of a recorded Zoom Conference Interview with audio and video, in which you will be asked questions regarding your experiences growing up as a minoritized individual that led you to consider pursuing teaching as a career and how your experiences compare with other minoritized preservice teachers. After data has been analyzed, member checking will be required to ensure the accuracy of my analysis.

Benefit
You will not receive any direct benefit from allowing your interview transcripts and video to be used in the research project, but I hope to learn things that will benefit the recruitment and retention of minoritized mathematics teachers to increase diversity.

Risks
The research is considered to be no more than minimal risk, which means there is no more expected risk to you than what you might experience during a typical day. There is the risk of the possible loss of confidentiality, as someone could find out you were in this study or see your study information, but I believe that risk is unlikely because of the procedures we will use to protect your information. You may feel uncomfortable sharing your opinions; however, please know that all responses will be kept confidential, and your responses will in no way affect your status as a teacher. Please answer every question as honestly and detailed as possible.

Confidentiality
If you agree to allow your interview transcriptions and video to be used in the research, I will assign you a pseudonym (fake name) and use that instead of your name on all the materials before I begin analyzing them for the research study. These materials will be stored in a secure location on the UT campus. No information which could identify you will be shared in publications and presentations about this study or databases in which results may be stored. If I wish to include your name, pictures, recordings, or other information that could identify you in publications or presentations, I will ask for separate written permission for this.

Future Research
Your transcribed interviews may be used for future research studies or shared with other researchers for use in future studies without obtaining additional informed consent from you. If this happens, all of your identifiable information will be removed before any future use or sharing with other researchers. All data shared with other researchers will have only pseudonyms replacing your identifiable information.

Contact Information
If you have any questions about this research, please contact me, Nicholas Kim, at nkim2@vols.utk.edu or 615-497-1419. My faculty advisor is Dr. Lynn Hodge, and you can reach her by email at lhodge4@utk.edu. If you have any questions about your rights as a research participant, please contact the Institutional Review Board (IRB) of the University of Tennessee, Knoxville, at utkirb@utk.edu or 865-974-7697. You may also contact the IRB with any problems, complaints or concerns you have about the research study.

Voluntary Participation
It is completely up to you to decide to be in this research study. Even if you decide to be part of the study now, you may change your mind at any time by contacting Nicholas Kim via email or by phone. You will not lose any services, benefits, or rights you would normally have if you choose not to volunteer, or if you change your mind and stop being in the study later. If you do not wish to be in the research, it is not necessary to do anything, as I cannot use your materials without your consent. If you choose to withdraw from the study, it is possible that data collected from you will be kept and continue to be analyzed, unless you notify the researcher to remove or destroy it.

Consent
I have read the above information. I have received a copy of this form. I understand that my participation in this research study includes allowing Nicholas Kim to use my interviews and video recordings for research purposes. I agree to be included in this study.

Participant's Name (printed)_____

Participant's Signature_____ Date_____

Researcher's Name (printed)_____

Researcher's Signature_____Date_____

Consent for use of images
I agree that the video recordings of the interview of me from the interviews may be analyzed for research purposes.

Participant's Signature_____ Date_____

Appendix C

Recruiting Minoritized Mathematics Preservice Teachers with Retention in Mind
Interview Script and Information for Individual Interviews

Hello! My name is Nicholas Kim, and I am a PhD candidate in Mathematics Education at the University of Tennessee, Knoxville. This interview is a part of my dissertation work on the topic of recruiting and retaining minoritized mathematics teachers. Your participation in this interview is completely voluntary. This interview in which you are participating in will last between 45-60 minutes. If you feel uncomfortable at any time during the interview process, please let me know, and I will end the interview immediately. I will also be audio and video recording the interview so that I can transcribe it later for research analysis. Your identity will remain confidential at all times. Do you have any questions before we begin?

Interview Topic: Minoritized individuals' narratives about their pursuit to become a mathematics teacher.

Research Questions:

1. How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?
    a. Does an identity as a minoritized individual affect one's pursuit of mathematics education?
    b. How has the teacher educator program aided or hindered one' pursuit to become a mathematics educator?
    c. What are the similarities and differences in experiences between different races and ethnicities that are pursuing mathematics teacher education?
2. What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs?
    a. What are barriers for minoritized preservice mathematics teachers to remain in teacher educator programs?
    b. What do you believe are the most important factors for minoritized mathematics teachers to continue teaching mathematics for a long career (over 10 years)?

Research Purpose:

The primary purpose of this research is to provide insight into the narratives and experiences of minoritized preservice teachers (PSTs) interested in teaching mathematics, and how that impacts recruitment and retention of those minoritized teachers. Minoritized, here, is defined as one who identifies as a person from a historically underserved community based on race or ethnicity. As a result, this study is positioned to provide researchers, educators, and administrators with much needed direction into how to diversify their teaching force beyond the dominant storyline of the White majority, and why it is important to do so.

Interview Questions

<u>About Individual Experiences</u>

1. Do you identify yourself as a minoritized individual? I define minoritized as one who deals with the power relations and processes by which certain groups are socially,

economically, and politically marginalized within the larger society. What race or ethnicity do you define yourself as?
    i. How has that impacted your life?
2. Is there anything you want to speak about being a minoritized individual growing up?

Educational Experiences

3. Describe your educational experience growing up.
    a. Describe contexts (social, political, economic), successes, or failures
    b. What were some major contributors to your experience?
    c. Do you remember having minoritized teachers?
    d. How did your parent(s)/guardian(s) contribute to your educational experience?
    e. How did your peer groups contribute to your educational experience?
    f. Describe how you perceived your minoritized peers' experience in education.

Pursuing Education as a Career

4. When did you decide to pursue education as a career?
5. Does your identity as a minoritized individual affect your decision to pursue teaching?

Teacher Educator Programs

6. Describe your experience so far in your teacher educator program.
    a. Can you provide any context about your program?
7. Does your identity as a minoritized individual affect how you perceive yourself amongst your non-minoritized peers?
8. Do you feel your teacher educator program has prepared you to become a minoritized mathematics teacher?
9. Is there anything you wished your teacher educator program would provide?
10. Are there any barriers you can think of that would keep you from finishing the teacher educator program for math certification?

Teacher Retention

11. What do you think are the most important ways to keep teachers like yourself in the teaching profession?
12. Do you think you can provide some extra benefit to the school or community in which you will begin teaching as a minoritized teacher?

Supplemental Questions

13. Is there anything that we haven't talked about today that you would like to share?
14. Are there any questions that you think would be helpful to my research that I should ask of other interviewees?
15. Would you be interested in participating in a focus group interview with other minoritized preservice teachers to talk about your similar and different experiences?

Appendix D

Recruiting Minoritized Mathematics Preservice Teachers with Retention in Mind
Interview Script and Information for Focus Group Interviews

Hello again! My name is Nicholas Kim, and I am a PhD candidate in Mathematics Education at the University of Tennessee, Knoxville. This focus group interview is a part of my dissertation work on the topic of recruiting and retaining minoritized mathematics teachers. Your participation in this interview is completely voluntary. This interview in which you are participating in will last between 60-76 minutes. If you feel uncomfortable at any time during the interview process, please let me know, and I will either end the interview immediately or let you leave at your convenience. I will also be audio and video recording the interview so that I can transcribe it later for research analysis. Your identity will remain confidential at all times. Do you all have any questions before we begin?

Interview Topic: Minoritized narratives about their pursuit to become a mathematics teacher.

Research Questions:

1. How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?
    a. Does an identity as a minoritized individual affect one's pursuit of mathematics education?
    b. How has the teacher educator program aided or hindered one' pursuit to become a mathematics educator?
    c. What are the similarities and differences in experiences between different races and ethnicities that are pursuing mathematics teacher education?
2. What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs?
    a. What are barriers for minoritized preservice mathematics teachers to remain in teacher educator programs?
    b. What do you believe are the most important factors for minoritized mathematics teachers to continue teaching mathematics for a long career (over 10 years)?

Research Purpose:

The primary purpose of this research is to provide insight into the narratives and experiences of minoritized preservice teachers (PSTs) interested in teaching mathematics, and how that impacts recruitment and retention of those minoritized teachers. Minority, here, is defined as one who identifies as a person from a historically underserved community based on race or ethnicity. As a result, this study is positioned to provide researchers, educators, and administrators with much needed direction into how to diversify their teaching force beyond the dominant storyline of the White majority, and why it is important to do so.

Interview Questions

<u>Teaching</u>

1. Can each of you describe your pursuit to become a mathematics teacher?

a. Race?
b. Culture?
c. Parents?
d. Peers?
e. Teachers?
f. Role Models?
g. Stories?
h. Teacher educator programs?

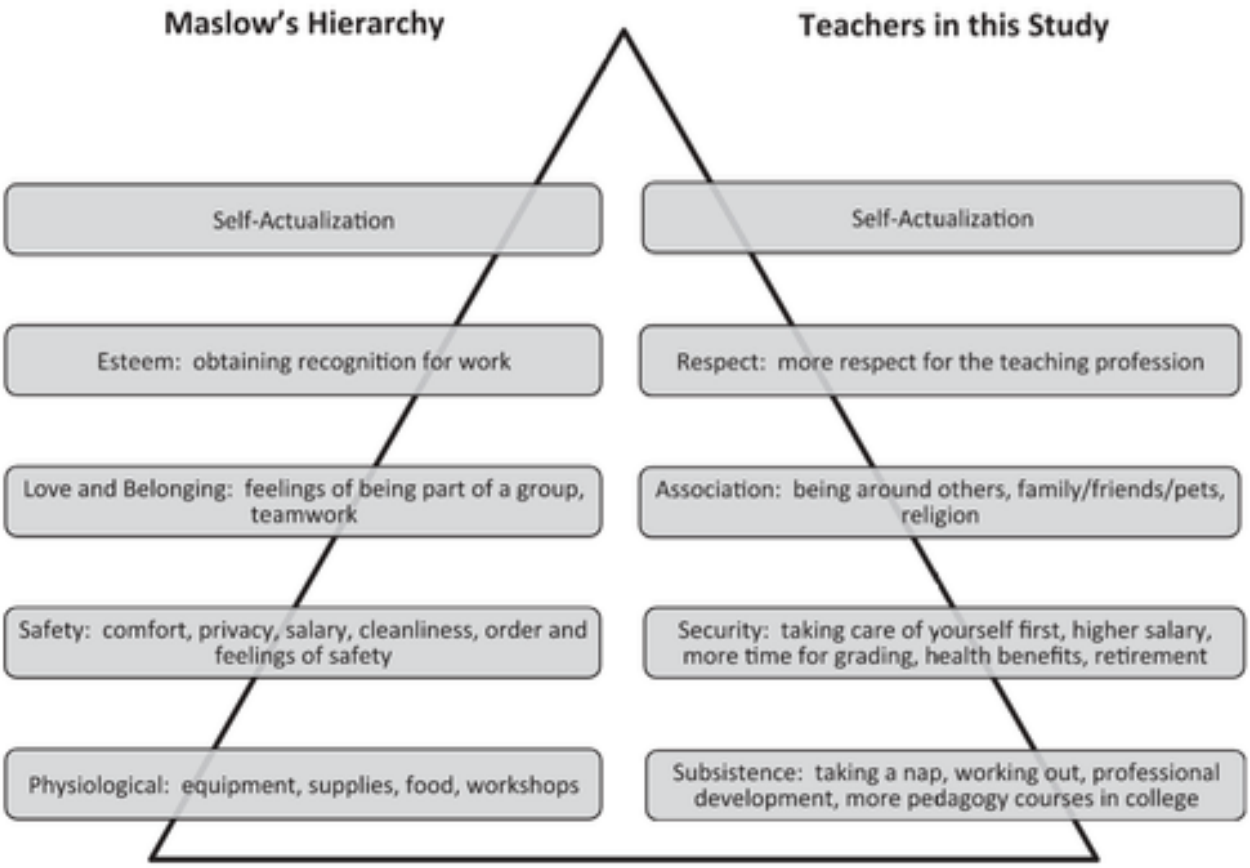
2. Do you find any similarities or major differences between your narratives?
3. Do you think being a minoritized individual has impacted your decision to pursue teaching mathematics in secondary schools?

Retention

4. What are the most important factors for you to remain in teaching for a long career?
5. Do you think it is different for minoritized teachers vs. non-minoritized teachers?
6. Do you think it is different for different types of minoritized teacher such as Black vs. Asian, Black vs. Latinx, etc…?

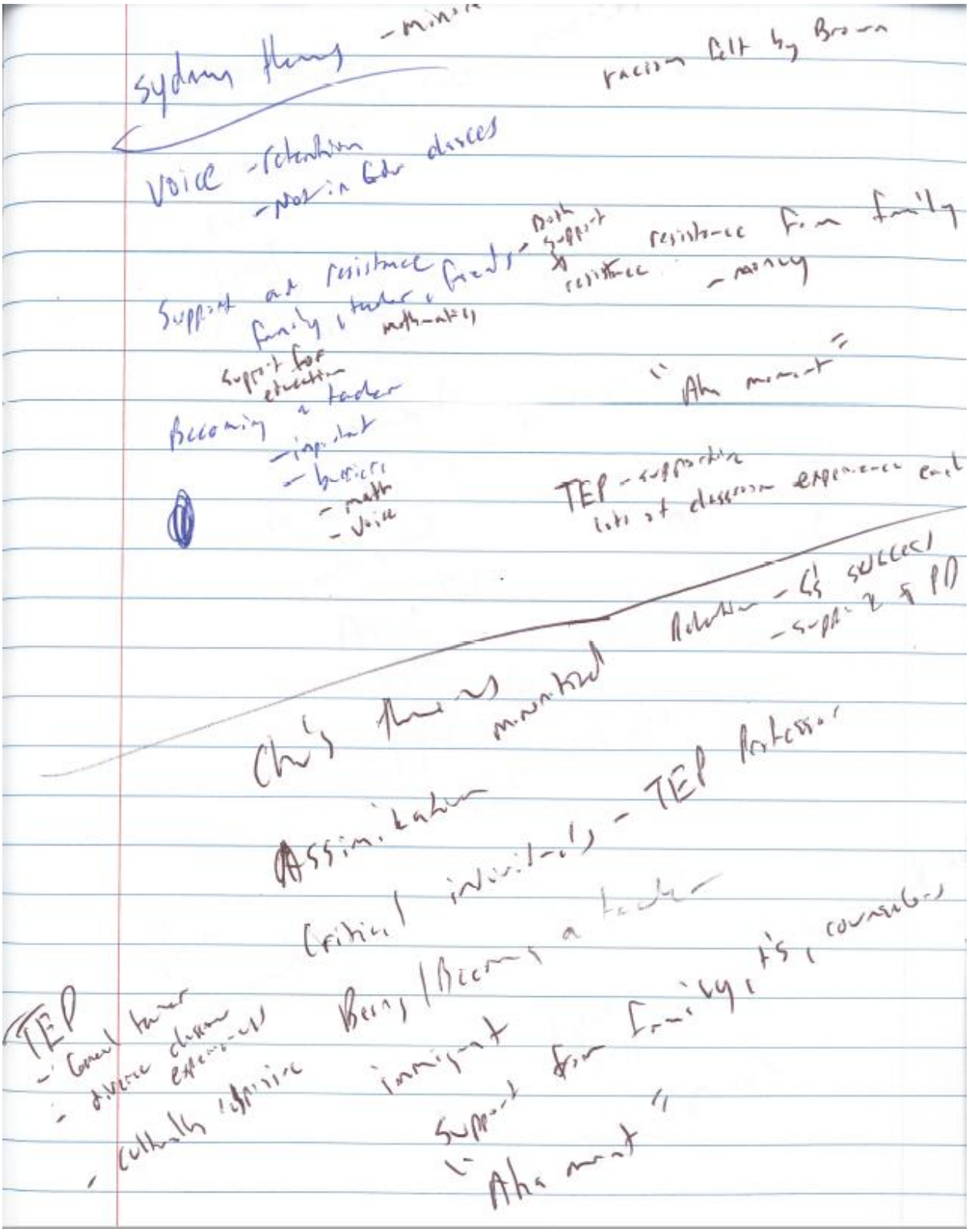
Appendix E

Maslow's Hierarchy Compared to Fisher and Royster's (2016) Hierarchy of Teacher Needs in Terms of Teacher Retention



Appendix F

A snapshot of the Research Journal



Appendix G

Example list of some of the possible individual themes for each participant

Sydney	Chu	Gabriel	Bethany	Tiana	Peter	Il-seong
Minoritized	Minoritized	Minoritized	Minoritized	Minoritized	Minoritized	non-Minoritized now
Voice- did not want to volunteer to speak about race	Immigrant	Race- identity	Mixed race-speaking both English and Japanese	AA, black female	AA male	Korean American
self-identifying as AA even though not African-identity	Assimilation	racism	diverse education-public and private-Japanese vs. international vs. bubble	opportunities based on race- positive	homogenous neighborhood - AA	immigrant
Support-Family Education	Language barrier/ math is universal	loner	competition in bubble	opportunities based on race-negative	AA teachers-female	assimilation
Support-TEP	Support from parents	critical individuals-negative teacher-motivation	Diverse teachers dependent on location	racism not mentioned specifically but feelings of denial based on race	lack of resources in school	teachers and peers friendly when immigrated
Resistance - Family, money	Support from teachers/counselors	CI- positive-teachers and coach	looked up to all types of teachers regardless of race	Over-exaggeration of minoritized individuals struggles	Engineering camp- STEM focused new public school	CI- parents restrictive-teacher pay
Resistance - peers-non educational	Support from peers	Undocumented	CI- parents-mother and sister	CI-minoritized teachers	lack of opportunities-motivator	CI_ all teachers caring
Racism	Critical individuals-TEP minoritized professor	Immigrants	Support-family	Schooling-homogenous - black and latinx students	Support from family- father	introverted
becoming a teacher-teachers	AHA moment-Sophomore yr in college	being/becoming a teacher	immigrant	Support from family-especially father	peers- did not value education	lack of care at home-

Appendix H

List of some of the possible resonant narrative threads from interviews

Sydney	Chu	Gabriel	Bethany	Tiana	Peter	Il-seong
Minoritized	Minoritized	Minoritized	Minoritized	Minoritized	Minoritized	non-Minoritized now
	Immigrant	Immigrant	Immigrant			Immigrant
	assimilation	assimilation	assimilation			assimilation
struggles with identity		struggles with identity				struggles with identity
Voice in the TEP classroom	Voice in the TEP classroom			Voice in the TEP classroom		
Support from family to value education	Support from family to value education	Support from family to value education	Support from family to value education	Support from family to value education	Support from family to value education	Support from family to value education
Lack of family assistance in education	Lack of family assistance in education	Lack of family assistance in education	Lack of family assistance in education	Lack of family assistance in education	Lack of family assistance in education	Lack of family assistance in education
Racism		Racism		Feelings of denial due to AA, lack of resources	Lack of resources based on neighborhoods	
Homogenous White community	Homogenous White community	Homogenous White community	Homogenous White/Japanese community	Homogenous Black/Latinx Community	Homogenous Black/Latinx Community	Homogenous White community
Teachers were supportive of her pursuing mathematics	Professor supportive	Professors were supportive of him pursuing mathematics	Teachers were supportive of her pursuing mathematics	Teachers were supportive of her pursuing mathematics	Teachers were supportive of him pursuing mathematics	Teachers were supportive of him pursuing mathematics
		negative teacher-motivator				

Appendix I

Sydney's Data Analysis Table

Theme	Supporting Quotes
RQ1: How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?	
Intersections with race	e I don't really identify with African-American. I'm not African. I guess I am back in history, but then half of my mom is Mexican, so it's really weird. I don't know. I feel like I just categorized into something, because I don't really feel like that's really me
	I don't really like black people, but you're nice.
	Yeah, I look back on it and be like, oh. And I didn't realize that when in third grade. I didn't realize that was something mean, but when I think about it, it took me years to realize because I didn't even think about that statement for a long time. It took me years to realize that it wasn't nice.
	Not that I don't care, but I feel like it's at a point where it's, me myself, I'm not going [to] be able to fix it. I can sit there and argue with you all day about why that's wrong, and how you shouldn't be that way, and things like that, but it's not... Sometimes I feel like it's arguing with like a brick wall, you're not going to change their opinion, if anything, I can worsen their opinion.
	I just try to portray myself in a better format because sometimes also I'm representing... A lot of times when I was at that rural high school, I would feel like I was representing all of the Black people, I guess you could say, rather than just myself, so I would try to portray myself in a better manner so that they wouldn't have a bad image.
Critical individuals: support and resistance	I was just a student. It wasn't like, Oh, she's an African American student, or anything like that. I was just a student, so I can't really think of anything specifically. If anything, my teachers were like, Sydney, if you applied yourself, you'd be really smart or something like that.

	I can be a teacher, because I really enjoyed working with kids, and then I would want them to feel the same way that I feel about math.”
	A lot of the kids that come here, they’re minoritized kids, and working with them it made me kind of realize that's kind of the demographic I would like to work in an area where there's a lot of minoritized kids. Just because I would want them to see someone that looks like them, doing a regular job, you don't have to do all of this [other stuff] you can do something else other than what you think you're doing, or what do you think you have to do? I would love to be a role model to my future students.
	My grandparents, they were like, Sydney, if you're going to school for math, don't be a teacher. And they kind of skewed my viewpoint a bit. And I was like, should I do something else? Because they made me feel like I was settling... They were like, you’re smart, so why are you going to pursue a math degree, then just going settle on being a teacher? And I was like, I guess, yeah, you're right. I mean, why am I just going to settle on being a teacher, but then I realized that I wasn't settling on being a teacher. They wanted me to go and work and get money, which is fine. Money is great, don't get me wrong, but I was like, I was not going to be happy with that. Man, of course, I'd be happy, but was I going to be genuinely happy? And I realized I wasn't going to be genuinely happy with that, so I went back to teaching.
RQ2: What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs (TEP)?	
Becoming/being a teacher	No. So we don't really discuss it. So, we talk a lot about having minoritized children in our classroom and accept children from all types of backgrounds and things like that, and that part... I think they do as good as they can with that part, because a part of that is there are certain people that I feel like probably shouldn't be a teacher... And it's not because they're bad people or anything like that. It's just because they're so stuck in their viewpoint that they're going to have bias. They're going to be biased and not in a good bias way, it's not going affect the children in a good way, so they tell us how to go about that part, kind of, in a sense, but we've never really talked about what it would be like to be like a minoritized

	teacher or anything like that. And it may be because there's not many minorities.
	I feel like just honestly, just more experience in the classroom. Yeah, definitely more experiences in the classroom, just because, I know I want to be a teacher and things like that. But I feel like even for other students, it would be better for them to have more experience in the classroom, that way they can really see if that's something that they want to do. In our TEP, it's a lot of group discussion, and you're bouncing your ideas off of each other, and I feel like as a teacher, you have to be open-minded person, you can't be a very close-minded person because you're going have students from all types of different backgrounds, all types of different situations and things like that, so if you're close-minded, you're not going to fully understand that student or accept that student, and as a teacher, your job is, of course to educate and teach, but you're also there your students are at school half of their day, so you're a very influential person to students.
	So, I totally feel like it could be a barrier, but not just for minorities, like for everybody, because math is hard. I'm going to do good this semester, but next semester I'm really worried about it. So, if I don't finish next semester, I'll have to do another. I don't know what I'm going to do because the next semester is all in my math courses... If I finish all my courses next semester, I'll end with student teaching. So, I'm like... I don't know, I feel like to be a high school math teacher, [but] I don't really feel like the level of math that I'm necessarily taking at this point is necessary. But...I don't really understand the... I'm taking this level of math, but it's fine, I mean, I'm not like... like I said, this semester is good. Next semester, not so much, but yeah. So, I mean, that in itself is just a barrier, just because the degree itself is so hard. Then it brings you back to what if I'm getting a degree in math, and why am I going to sit here and go be a teacher that probably doesn't get paid very much, and then [my] voice might not get heard...
	Maybe with parents, especially because I'm a female math teacher, and then I'm African American. So, I can see with certain parents, it being an issue. I don't feel like it would be an issue with any of my peers or anything like that, but I don't know for sure.

	I don't know, I assume. I genuinely don't know. I talk, I hear a lot of people talk about pay, but I'm not really big on pay. I guess I will be once I start teaching, because I really don't know how much you get paid as a teacher and things like that, especially in my city. But maybe really just allowing me to be heard as a teacher, so I can put up with a lot of stuff, but I'm the one who's actually in the classroom. I'm actually teaching the students. I'm like, you know, I really think that this should happen, or this isn't working, or something like that, then I feel like that would really affect me either wanting to stay at that school if my voice isn't being heard or wanting to stay even in that field if my voice isn't heard. Because if I'm speaking up on something, it has to be like a big deal, it's not like a small matter.

Appendix J
Chu's Data Analysis Table

Theme	Supporting Quotes
RQ1: How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?	
Assimilation or identity processes	[They] gave me a warm feeling that I can fit into this place, once you have more sense of belonging, that gave me more motivation and learning. Also give you better school experience by having those friends to make you feel like you are not just a learner, so also you have [in] life... you have friends that you can help you learn about all different things that you cannot learn from school.
	give [me] a lot [of] help, and we study together. And she explained a lot of things to me, so that makes my life more colorful
Critical individuals: Teachers	She resonated more with me as a minority student teacher, so she knows what we need to be successful and try to be on your side and help you to be successful. And more than just give you a lecture, like facts... but she also taught how to be more patient with students and knew how to get you more motivated.
Becoming/being a teacher	"broken English" was able to help her peers because mathematics is the "universal language"
RQ2: What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs (TEP)?	
Becoming/being a teacher	I have more of my own thoughts and my own ways of solving math problems since I have that time and education in China, so different math tricks I would like to teach my students.
	At first, I will worry about being minoritized teacher, in teacher community, not student community, how you're going to get along with American teachers, because if you are the only one that is minoritized,

	that's one thing I am more concerned about because if you still not totally know their culture and how do you communicate with the white teachers.
	I think I did put too much pressure on this goal, because it is the first year, it's hard to be completely successful as a first-year teacher. So, I thought it would be very easy for me to have immediate student success... but when I did not... I thought I was not a good teacher. I think that was a hard time [for me], and I knew I had some ability to teach them, so like you told me you need balance between growth and success. Each year I will get more experience, and I hope not to focus so much on student success.
	A second thing is giving extra supports and to have a great professional development program for new teachers that can match your teaching style. In order for you to be successful you must learn new things because in order for your students to be successful, just knowing your content is not enough, you must know your students much more in-depth. And when you do learn about your students, you will have the great strategies to teach them.
	I think that actually came to mind once, like helping students who like me didn't know English, like minoritized students who came to the US. Like an English as a second language (ESL) student not knowing the language, have a difficult time learning math... I had that experience, so I can resonate with them more and know the way to help them, since I already had that before, but internally, the reason wants to be a teacher to help all students. Attend to equity and access to the resources they need.

Appendix K
Gabriels's Data Analysis Table

Theme	Supporting Quotes
RQ1: How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?	
Intersections with race	I've had people tell me racial slurs, call me, call me racial slurs and people telling me to go back to my country even way before the how the political climate is right now. But also they've told me, well, you know, you should speak English and that's it.
	The the arrogance kind of shattered at that moment because it made me realize that I was no better than anyone else. Being like I always look down on people that were like, oh, you know, you don't speak English, you you I mean, I, I mean, I knew I was from Mexico, but I did not know, like, my parents didn't directly say, hey, you know, you're not documentary, you know, but that arrogance just kind of blew away once I found out I was undocumented. And and and that had given me a different perspective in life and made me more humble and maybe made me more open, like open minded to see, like, what others go through.
	I was not Hispanic enough to be with Hispanics, but I was not either American enough to be considered American. So I was in limbo basically. Yes, no, I mean, it was the struggle between the two identities and my Mexican or my American. Well, who am I?
	a different perspective in life and made me more humble and maybe made me more open, like open minded to see, like, what others go through
Critical individuals: Support and resistance	loner
	it wasn't because of my grades, [but it was] because I'm Brown and doesn't expect me to be much
	Yeah, like, I had a couple of experiences in in middle school and stuff to teachers in particular, which they're going to be anonymous. I know them by name because to this day I remember what they say. But like my eighth

	grade math teacher in my eighth grade English teacher just. I worked hard in math class or I felt like I was competent enough to be in high school mathematics just, you know, in the get go and stuff like that from the get go, I mean, and she was like, you're not ready for it or anything like that. I'm going to put you in the lowest math course. Below, below standard, below high school level, so I go to high school and she, you know, that that math class, I again, I, I didn't even work towards anything like it was it was so easy that that it was just like, OK, I know the answer to this and I try to get out of it. But by that time I try to get out, my guidance counselor can do anything about it. Yeah. So I don't know. Again, I don't know if she was. Being like, I don't know if she was putting me down for some reason or not or just basing it off my grades. I don't know, I but that does come to mind all the time that like even before I even started college or anything like that, I just was like, was I in my good enough for this and things like that? And I basically spoke in my English made English teacher the same way. I mean, she I mean, I would never said that I was up to English level language and stuff like that. But the way that she treated me consistently throughout my year there, it was just like, you know, like she treated me differently. And at that school at that time, I went to West Valley and West Valley, majority, white. And at that time it was new, like maybe a year old. I want to say, oh, I could count in both my hands the amount of Hispanics that were there. I mean, I can probably count on one hand, actually, that's like I mean, I still remember to this day just the way that she treated me and and my my math teacher treated me as well. And so that fueled me to, you know, I'm better than this. Like I'm not behind. (white teachers)
	I mean, again, I don't know. I'm just basing it off my memory and how I write it makes me feel more like just thinking about it. I'm like, why did she tell me that? It wasn't because of my grades or just because I'm Hispanic or doesn't expect me to be much. Right. Let me I know that's that that I mean, I've read in some articles that that. Usually happens or that tends to happen at times. And like, I don't know if that happened to me right there
	I mean, there's just one teacher. She she invited me back. It was an English teacher in high school. She invited me back after, you know, being out of high school. I think I

	think it was a couple years after high school. She invited me back and just talked to the class basically and said, well, this is life after high school. You know, you got to you got to work at it. You got to do make good grades, you know, go to college, do something, you know. But if you don't want to go to college, you know, you work you work hard and just go for it. And stuff like that, so like she was the only one there was this Home EC teacher. She's she's actually currently still teaching at Bearden and. And that's home economics, which we learned how to cook, so do other things and stuff, love and like, I love cooking and things like that. I mean, I'm not much of a I don't so much because I don't know, I'm not dealing with that, but I'm more interested in cooking and stuff like that. So she she motivated me. She helped me out. And she I was part of the. I forget what I think it's a it's a it's called FCCLA, and I don't know if it's still around, but I was part of that group where we went to go. I actually had the opportunity to go to the Opryland in my high school time there and just compete in different events and stuff that it was pretty cool. But yeah, those two teachers motivated me to go forward and stuff and just I mean, I had coach and coach as well, like from wrestling and stuff for pushing me forward. I mean, I, I did struggle with weight. I mean, I'm a big guy anyways, but I struggle with weight at a high school. And when I first entered high school and coach pushed me, the assistant coach pushed me as well. And so like they they helped me go forward. And then the teacher that helped me in those two classes, I mean, there were Caucasian women, white women, and then the coach. A South Korean.
RQ2: What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs (TEP)?	
Being/becoming a teacher: Critical experiences	Well, I mean, I don't talk to a lot of Hispanic people, but I know there is a Hispanic community at Maryville College since Maryville College accepts people with DACA and there are some scholarship opportunities for students interested. So, I mean, there is a higher from again, I gather there's a higher population of Hispanic Americans.
	And then a couple teachers, few that, you know, did a positive impact.

	So you had the education program is helping me be like a just a generalized teacher in general, right? Not specific to to to to my subject, I guess.
	I guess racially profiling, I mean, I guess what I want to say, but but I mean, I don't want to say it because, like, I don't want to be like. You know, you're doing this because of this and, you know, I don't want to make a Uproar over it, right?
	Why do you believe the things that you believe? Do you believe it because your parents said so and that, you know, I mean, you live under their house? I mean, I'm not teaching them to be rebellious, but like is it because of that, like is it because of your obedience to your parents. Which I mean, again, I don't want to create rebels here, but like what makes you believe that this is true? Can you give me an experience, and what is your thought about it? I want my… I guess my whole approach to teaching is to help them think, help students think critically. Yeah, absolutely. Ground them and make an educated guess, make an educated decision, statement, decision and move forward with.

Appendix L

Bethany's Data Analysis Table

Theme	Supporting Quotes
RQ1: How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?	
Diverse education	My high school was definitely a very competitive environment. Everyone strove, just strove for the best. Like they wanted to be the best and they want it to be the top of the top. And so, I think, it was definitely a competitive environment. I just remember one experience of my, like all my friends getting super high thirties on their ACT scores. And even if they got to 33, they were still complaining. They were like, Oh, I got a 33. And it, I was like, am I supposed to get that? Like, is that like normal? Then I would ask all my friends from other schools and they'd be like, oh yeah, 33 is like super-duper good. If you can get a high 20, that is good enough. But then I would hear kids from my high school being like, Oh, that's not good enough. And so that definitely was a different environment for sure.
	They, so at Japanese school they were all Japanese teachers, but we did have like, um, like an American teacher come in, like to teach English just like once in a while. Um, and then we had at the international school that I went to when I was in, um, like elementary, my early elementary school years, we had different, we had teachers that were, um, like from England or from like Australia or Canada. And then like I had a teacher that was from, um, who was Japanese, but she was married to, um, an American Caucasian guy and, um, and she could speak English fluently. So we ha we had like a diverse, um, group of teachers. And then at the other international school, I, they were all, um, I believe they were all white except for one teacher. She was, she was mixed. She was half, half Japanese and then like a quarter Chilean and then a quarter white, so.

	They definitely wanted me to, like, from when I was a little kid, wanted me to know both languages. And so like from a young age, like, I don't know from when, but they've always spoken to me in both languages. So it'd be primarily my mom speaking to me in Japanese and my dad's speaking to me in English. Um, and so like, that's, that was their like goal. Like they wanted me to know both languages and to be able to speak both because I know with my dad, at least he, he, um, grew up with like the divorced parents. And so his, he was raised by his Japanese mother and, um, but they, he grew up in Seattle, Washington. And so, um, he grew up speaking English, but his mom would speak to in Japanese. All he could do is just understand it. He couldn't speak it like, well, he had, um, the foreigners accent and then he could not write at all. So he just knew he wanted like, so that we wouldn't struggle later on in life to like note both. Cause it like has an advantage to know both.
	And so that fueled a little bit of competition as well. Um, and I think at Japanese school it was a good experience because I was like, I was like at a huge, like I was, I guess I had to learn how to show humility and be like, it's okay to not know much. And through that, like my were helping me learn the language. And I mean, especially like learning how to write, they'd be like, Oh, okay. That's not right. Like you got correct this. And they were just supportive and it was, it was a good experience in that way.
Critical individuals.	I've talked to all my friends, and we call it the bubble for a reason. And it's just like, I think people get on their high horses, and they think that every time until they get to college. I think we've all realized once we get out of the bubble and once, we get to college, we see so much more, and we see so many different people and so much diversity. And so, I think definitely bringing that into like a high school level, or even secondary, like middle school would definitely help to open like kids' eyes rather than,

	than them like being thrown into suddenly going into college and being like, well, I didn't know there was an outside world than just this little bubble.
	baby whisperer
	It definitely felt different from going from all my life, being in an English speaking school to going to fully Japanese school. I had like spoken Japanese at home and written in Japanese, but it was definitely a lot more challenging because it was going from sixth grade and at sixth grade you're expected to be able to write pretty much like everything. And so I had to go from not knowing how to like, knowing how to write kind of, but not knowing how to write like the formal characters to having, like, to being, to, having to learn how to write fully and then being like speaking Japanese all the time with my friends. Um, but I definitely did enjoy, like being around my peers, that were Japanese, they were really sweet. So that was good.
RQ2: What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs (TEP)?	
Becoming/being a teacher	I think I knew definitely by high school. I knew I wanted to be a teacher. Middle school was sort of when it all started. So, I remember in elementary school in fourth grade, all my friends were like, Oh, I want to be a teacher. But I, I was like, Oh, I don't want to follow them just because they're saying they want to be a teacher. I'm not going to go down that path. So, I didn't know what I wanted to do, but then I've always watched, my mom has always been really good with kids and she's always like, been like a, um, basically a baby whisper and she's always just like, love kids. So, she works at a daycare. And just seeing her interact with kids has definitely inspired me. And then I have a little sister and we're seven years apart. So just growing up with, in that environment of like having a younger sibling and taking care of them and basically kind of like playing like teacher role, at times, definitely did start getting to go on the teacher

	career path. And then I think, I know for sure that during high school in senior year, like I knew I wanted to go into education. So, I applied to schools, an education like field, and I definitely wanted to go, I've had for sure, wanting to go into elementary education, but the university I decided to go to did things differently, so I made the change to high school since I did not want middle school.
	My TEP definitely was an experience that I didn't think that I would have experienced because I wanted to go to a super small Christian college up on top of the mountain. And so, it's definitely like opened my eyes to seeing like there's more than just being in one area knowing one thing because my university is a public school. It's definitely like they're open to, or they emphasize like, I guess, diverse learner learning and diverse backgrounds.
	norm

Appendix M

Tiana's Data Analysis Table

Theme	Supporting Quotes
RQ1: How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?	
Opportunities based on race	I [felt] being a minoritized individual growing up, a lot of people place more setbacks on us than there should be. I feel growing up a lot of people may over-exaggerate the things that we might go through, and I feel like it is hard being a minority, and I'm not going to deny the fact that some things are harder. I feel like personally... that's more [of] a reason for me, I can't speak for the other minorities, but I know that's more a reason for me to do what I do in life. But my future, I know being a minority I had friends who fit into that expectation of minorities used to do this, to do that, and I see friends just like surpass all of that, like myself. So, I don't really feel like minority has been a burden, but it is hard. I can say... I would definitely say that it is harder, but I feel like in some cases, I don't know, I guess it's just like how I was raised in the kind of mindset that I have, I do agree, and I can definitely say that is harder for someone... It is harder than someone who would not identify as minority, but for me personally, I just feel like in some cases, we make it harder, if that makes sense, we hold that mindset that, Oh, well, this person it's going to be easy for them, but... And I feel like we hold it against ourselves sometimes, but it definitely is harder, and we have... I feel like we do have to work as hard.
	I feel like being an African American young woman, um, there are pros and cons, but for the most part, um, I can't say I haven't have had a good life for the majority of the years, educationally, it has probably impact in my life, probably the most, because of the benefits of education and sometimes consequences of my identity, but for the most part, been a woman it hasn't been as hard because I don't really... I never really had any conflicts, or many problems because of my gender or whatever, but because of my race, there have been situations where probably like say for

	instance, a job or educationally trying to get into programs, I have succeeded or been able to do it so do so much as others, because of what I identify as. But generally, in my life, I've never had problems identified because of my identity, but that has been instances where there have been like differences or like lack of things that I could do because of my identity, but it's never really just been a problem for me.
	I remember my sophomore year of high school. I was applying to go to Governor school actually, and so I got into Governor School two years actually my freshman year and my junior year... But my sophomore year, I applied to a different program, and it was a different program, and I applied, and I actually had got some... Were like instructing everything, and I let her... And I tried to get you to honor person level, because me on person where it's like I like to apply for things to get involved in things, I like to build personal relationships and I guess you got to know me more and usually like me or applicant, there are selections about your race and what you identify as, and I found out that I was like two out of four people that were black that applied, and I remember being in a group chat, everyone that applied, and none of the people that identified as African-Americans or black got in, and I kind of feel like in that situation, that I was not picked because of my identity, because I had the score to get and I had the grades, I had everything, recommendations and everything, but one of my instructors and one of my teachers and my high school told me that that's a program rarely where you see an African-American from a community where I grew up in...To get into a program like that, so that was probably the time that I kind of knew like in some cases, in life it would be hard, it's such harder or much harder to get into programs or different jobs or whatever, because of what I identify as or because of my background.
	I remember in the moment getting denied access to the program, I remember being very emotional, crying and upset, but I had a conversation with my dad, he's one I always just tell me straight like it is, and pushed me to reality, and I'm going just have this

	conversation with him and him just telling me like, It's like it's one a lot of situations or more outcomes, like where you won't you pick for this or picked for that, telling me that it probably couldn't have been there, I could have been like some other factor or whatever, but he was just like in life, this is what it is. So growing up, I never really had a problem academically, because I knew that I was smart, I knew that I was capable of getting some more programs, so I never left there just holding me back and making me feel like, Oh, I'm not as good enough as these students that are high achieving.
	I would definitely say that it is harder, but I feel like in some cases, I don't know, I guess it's just like how I was raised in the kind of mindset that I have, I do agree, and I can definitely say that is harder for someone... It is harder than someone who would not identify as minority, for me personally, I just feel like in some cases, we make it more harder, if that makes sense, we hold that mindset that, Oh, well, this person is gonna be easy for them, but... And I feel like we hold it against ourselves sometimes, but it definitely is harder and we have... I feel like we do have to work as hard.
Critical individuals.	I'm a type of person, I like to surround myself with different types of friends, so I like to have friends that are opposites. I had a group of friends, they were high achiever[s] like me and others didn't really care about their education, but I feel like the only reason I do that, and I do that to this day because I like to have friends who motivate me, so my high achievers, they also motivate me, but it's because sometimes with those kind of friends, I have a competitive mindset, I never make it a competition, but it's also like, Hey, my friends are getting straight A's, so I'm going to get straight A's. [But] I had to remind myself, some people don't just achieve [academic success], so I like to surround myself with those who may slack off, so I can be a motivator to them. But it also is a reminder that some of us who just really don't care, like I had some friends after high school, they didn't want to go to college, I have some friends who fall into that minoritized mindset stereotype, and having children early or like, not going to college.

	I actually decided to pursue education in eighth grade. I literally remember all my math teachers playing a role, but ironically none of mine were minorities, none of them. They were all women who weren't minorities, what... I can say they had a lot of respect and dedication towards helping minorities, I remember deciding in eighth grade we had one teacher in particular… I say this a lot to people when they ask me, why do I decide to become a math teacher? But I remember one day, she called me out, she knew how passionate I was about math, and I remember I always passed out my tests, homework, quizzes, and everything. And she asked me one day, could I tutor outside of school? After school, and I remember telling her like, no, I don't want a tutor. I feel like it was a fear. And I remember she called on me one day, she asked me to come to... In front of the class and explain how I got a problem. And I remember sitting there looking at her like, No, I told you No, I can't do it. And I remember she was just telling me to, "come on Tiana, yeah, everybody else doesn't understand it. Can you come explain it?" I remember feeling so nervous and literally was about to faint, and I was like, No, I can't do it. I remember she came over to me because she was like; your class needs you... She said just imagine if you felt like your classmates, you [would] want somebody to explain it, and I was like, Yeah, so I got a ton of the questions [from my classmates] ... I remember just standing there under pressure, and I just started working out the problem. And my class was asking me questions and it was coming out naturally, everything seemed fun. I remember going up to her after school, and I was like, Hey, can you call on me tomorrow in class. She was like, I don't know, I thought you didn't like it... And I was like, No, I loved standing up there, like explaining to the class, and they were asking me questions.
	I had another math teacher, and I remember she was my algebra 2 teacher, and she used to let me like grade and make lesson plans and everything with her... I said to her, Can I teach the class today? And she was like yes, me and my Math teachers letting me, it was just a great experience, and it was all because of my eighth grade teacher, and she just randomly

	called on me to stand in front of class and I was so under pressue once I got up there I was just like, I could do this for the rest of my life.
	Yes, definitely. Another reason that kind of motivated me to become a teacher was because I remember being in school and talking with some of my teachers, and I had really like those teachers, like my teachers, like I said, they performed they... Formed close relations with students and I remember getting into the top of the bread line and gain injustices like in the school system, and I remember comparing like the neighborhoods, like I was doing comparing to different neighborhoods, like say for instance, my neighborhood of course, it was full of minority, but then it was like the neighborhood to my city, like me, we call you feel worry, and it was predominantly wiring neighborhood, so I think that all of the resources I... Sardinian to the asset I went to. We had no books, like notebooks, it was strictly print paer if we had to read a book, it was printed on paper, and I remember a lot of stuff, resources that we needed as students we couldn't get because of money and funds for the school, and so I used to wanna be a teacher because I feel like there should be no way that students have limited amount of access to education 'cause of where they stay, where they come from, and I just feel like it wasn't fair and it just wasn't just at all that some students in a different neighborhood because their parents to make a certain type of money or because they come from this place, they get to have All these resources, they get to have all these tutoring and stuff.
RQ2: What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs (TEP)?	
Becoming/being a teacher	Well, I don't think that I'm supposed to be a teacher because I'm surrounded by people that are wanting to become teachers that don't look like me, and my dad was just like, that's more reason why you should want to become a teacher because it is rare for teachers that look like you. And I was just like, I don't know. And I remember I'd never want to answer questions, I never wanted to speak up, but I formed relationships… It was just like a fear that they didn't

	look like me, but that was a lot of my classes to be sitting around people that didn't look like me.
	There actually is a difference in teaching minority students, and I feel like we don't really hone in on that topic a lot, and I feel like one reason... Me as a student, I don't bring it up too because I feel like sometimes when I bring it up there is this uncomfortableness that it brings, and I'm not sure if I could speak up about things like that, and we do have certain topics [about minoritized students], but I just feel like I don't really see that in the [TEP] classroom, but I know coming from a high school where we talked about stuff like that, and I remember, even teachers that weren't minority would frankly say how you know, Like in the real world, you have to work like this or being a student using that, but I don't feel like here at this university, we get to talk about that as much, but I feel like it is because there aren't a lot of minorities inside of the classroom because I know the education class I take right now I'm one of two.
	I actually had a personal experience with a minoritized teacher that I had [as a teacher], I can speak for it, but I remember... Back in my high school, we had an African American male teacher, and he taught my African American history class. My school was really big on test scores and pushing students. I remember the students that he taught the class too... I was actually in an honors class, and we had honors AP classes and stuff like that, but the class that was just like a regular class that weren't performing as well. And I feel like he took that to say like he wasn't doing well as he should as a teacher. And so, I remember he came to speak to us and was just like this is something I have to walk away from, students cheating their way out, and he was just like, he no longer and wanted to teach.

Appendix M

Peter's Data Analysis Table

Theme	Supporting Quotes
RQ1: How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?	
Opportunities based on race	Because most of my life, I grew up around the people with my skin color, people of the same look as me, so you really didn't notice anything different. But when I got here [to my college] ... It was very different. It was actually before I enrolled, I went to a summer camp engineering program. And most of the people there were either white male or a white female, and so with that, when I got there, I realized that I was probably far behind because, one, my ACT score was a lot lower than everyone else, and just talking to them about where they grew up in the schools. It was much different. Most of them went to private schools, and they had like special training for the ACT while I just went to a regular public school.
	Personally, it made me want to work harder because I feel like I'm behind, so I want to get on the level where other people are, but also, it's kind of unfortunate that we have to deal with being at a disadvantage like that without being exposed to all the resources the others are exposed to, but again, personally, I use it as motivation, like I have to work harder because I don't have those resources.
	I transferred to another high school that focused more on STEM, with that I had an opportunity to get involved in science competition called Science Olympiad. Yeah, that was probably the best opportunity I've ever done. I'm glad, I got the opportunity to do that because it made me realize that I actually did want to do engineering because before that I didn't really know what engineer was, and my teacher, she pushed me to get into it, but I didn't really want to because I didn't want to get out of my comfort zone, but eventually I was like I'll join, and I ended up being the best time in my life, and it made me realize

	that I even wanted to do computer engineer or electrical engineer.
Critical individuals	But I did have, I have two friends... Feel like a role model to me. I still talk to them now, and sometimes I would go in and ask them how they're doing and make sure they're okay, and sometimes I would ask them, like I asked one of my friends, for help on my work, because she's a chemistry major here, you can see and I'm taking chemistry now, and it's a foreign language to me, so a lot of times I'm asking her for help.
	My dad did have pretty high expectations for me, I guess it was on like when he saw my grades, he was like, Okay, he has high potential, so I should expect them to do well the school, but he didn't really like necessarily help with school.
	I focus a lot on STEM, I was more interested in it that we were just doing a regular Algebra, regular classes. And then in high school, for ninth and 10, I went to a regular public high school that didn't focus much on STEM, it was nice, they focused more on trying to get student scholarship to get into college. Yeah, so that was my first high school, but then I transferred to another high school that focused more on STEM, with that I had an opportunity to get involved in science competition called science Olympiad. Yeah. No, that was probably the best opportunity I've ever done. I'm glad, I got the opportunity to do that because it made me realize that I actually did want to do engineering because before that I didn't really know what engineer was, and my teacher, she pushed me to get into it, but I didn't really want to 'cause I didn't want to get out of my comfort zone, but eventually I was like I'll Join, and I ended up being the best time in my life, and it made me realize that I even wanted to do computer engineer or electrical engineer, and I end...
	They weren't really involved with my education 'cause they were more so working and not by for the family, so they didn't really get involved, and if I do have a question, my dad usually say it's been so long.
RQ2: What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs (TEP)?	

Becoming/being a teacher	When we had study hall. I would just ask the teacher if I could go to his room. When I went to his room, and he would ask me to help his students like with their work and stuff, and I was just going around the class monitoring basically. And people who would raise their hands, I go would over, they would ask me a question, I would teach them how to solve the problem. I kind of used that as like a template for my decision, because it was like, okay, if I think that this is like basic teaching, I can do this and perfect it. Basically, I think I can be a pretty good teacher to help others...
	We're all trying to be teachers, and we're all trying to become a teacher of math or science. I feel like that probably helped me a lot because instead of everybody just focusing in on me because I'm minority, it's like everybody's just trying to help each other, and we all just in this together. And I love the teamwork aspect in it, because with that, I don't have to worry about people thinking that I may not be able to do it because I'm black or whatever. I just worry about; can we all do this together? Can we all work together and get this complete... Can we all become teachers and hopefully make the world better?
	help me become a teacher as a minority
	I don't want to [teach in] college because I want to help younger kids. Basically, what they already want to do, I don't want to teach them [that]. I want to teach something that they don't know, so they [can] go do it later in life.
	I think there are a lot of things that a minority teacher could provide because outside of school, you do have students, and they're like, okay, since he looks like me. You know I can do that too. Or since he did it, and he's like me, I can maybe do that too. That's what I want to show my students, because partly, I didn't have that until I got to the eighth grade. That was when I had my first black male teacher. So, with that, it's like, okay, he's a teacher. Maybe I could possibly do the same thing and tell them how to be successful, because he was a great teacher. I definitely think I can help the community overall, but specifically the school, if you're an efficient, effective teacher, and you help your

	students understand what they're doing. That would definitely improve test scores, and if you improve test scores, I'm pretty sure you would probably get more funding for better technology, better foods and stuff like that, that would help the school in a long run.

Appendix N

Il-seong's Data Analysis Table

Theme	Supporting Quotes
RQ1: How do minoritized preservice teachers' experiences contribute to their decisions to pursue mathematics education?	
Intersections with race towards assimilation	So, I definitely do not remember stuff back in Korea. So that's probably good. So, when first came to the US, though, I was enrolled in an ELL (English Language Learners) program. Well, my parents didn't think or like my dad is kind of very like gung-ho, I guess. I don't know. Or just like kind of like brute force kind of guy, I guess. So, he was just like English classes or like Korean classes. He doesn't need, he can just learn it on his own or whatever. So, I was just put into a regular American school. I didn't know a single alphabet letter, so I was just put on an ELL program, which didn't really help much because they're not designed just for Korean. They're designed for all ELL students. So as a matter of fact, I don't even remember how I got in trouble one time, but they made me write this one sentence like about 50 times. And I didn't know what it was at the time, but it was supposed to punish me, I guess.
	People were really generally kind to me. The teachers were pretty kind to me. I had support. Yeah, those are kind of like my experiences in the early days, I feel like I didn't really feel I was minoritized. Well, I guess like for the quizzes and exams, because I had to take like easier English exams and quizzes. Like when I remember specifically in third grade, I think, or second grade, the kids were getting a spelling quiz. And I had like a different spelling quiz. Like spelling words like Bee or not even Apple. Just like three letter words like box.
	way more American than Korean
	I guess after I learned the language, it was more of learning the social cues and stuff like the social dynamics, and how it differed from Korean stuff. I guess one example is just, this might be kind of bad to say, but just like cursing, I guess, is the first thing you learn, cusswords. Yeah, but like especially in American culture. I feel like it just gives you that not power, but like social

	power. Especially with the group of kids, if you know a couple of curse words or whatever, it's like, oh wow. Like this guy was shy and didn't talk all the time, but like he can say these words, he knows how to communicate and stuff.
Critical individuals: Support and resistance	brute force
	second parents
	Yeah, so whenever one of my peers came to me for help, I really enjoyed helping them out and like teaching them like, hey, this is what I learned. Like, I think you should go about it this way. And, yeah, I just really liked that. That was one of the other reasons. Plus, I just look at like the jobs out there, I guess, and none of them really particularly interested me and then my parents, you know, that Asian mentality is like you ought to be a doctor or some lawyer. Yeah, but then they were like, actually, we don't think you'll do good with blood. So, I don't think you're going to become a doctor because you're too, like, introverted and just like shy or whatever. So, and then I told them, OK, I want to become a teacher. And then here's another rude awakening for them. That they're still kind of like figuring it out right now, I guess, or like they're just starting to figure it out.
	Teachers don't make as much here as in Korea. So, yeah, I told them what my wage might potentially look like and they just like, wait. That's it.
RQ2: What reasons do minoritized preservice mathematics teachers prioritize for staying in teacher educator programs (TEP)?	
Becoming/being a teacher	If you do something wrong, like turn in something late. You just get bash, bash, bash like, you know, like there's no warmth in any of that. But in America, like, you know, if you are not performing well, if you're not doing something or if you don't turn in something, you explain it. And most of the time they'll be like, thank you for coming to me about it. Is there anything I can do to help you? They always try and help you out. They're not going to bash you right away unless it's for something really, oh, you messed up like you goofed off. But I think that's one

	of the things that really contributed to my successes, especially because, like I said, I didn't have the best relationship with my parents growing up. I liked being in school more than in my house most of my high school days. And most of that was because it was like a friendlier environment in the school and the teachers were just so kind you know. Like I felt like I could talk about anything with them and maybe they put off me a couple of times, but they were just generally good people that really want to help the kids out, you know. That's one of the reasons why I want to become a teacher too. It's because of those teachers that I experienced where, like, man, I love having this kind of relationship with them. Like they really want to help me out. It really helped me out growing up, having a kind of like second parent figure, I guess.
	Yeah. So, it just felt like I was subbing for each day and I didn't get to know the students at all. The students didn't get to know me at all, and it just felt awkward like all of those like random teach things that might have been just me, but that's how I felt. I felt like I would have gotten a lot more if I just took over like two days in a row, three days in a row or something.
	for the money
	But what would have been better is maybe have a full week of teaching or maybe even like three days back to back or something, you know,
	I mean, I still feel like I'm a half minority teacher, so. Yeah, definitely I definitely feel like I can bring a lot to the table right now. First of all, I know a second language, so that's that's a pretty good factor. And I feel like I just relate to these kids that aren't. That aren't like this, kids in your cousins are going to be fine on their own, like they have their families, the support, they have friends and stuff, but the students that. Are in an unfortunate situation like at their age, right? I think I can personally connect with the students and be able to understand and tell them, like, hey, is anything I can help you with? Is there like what's going on at home? Or like if they want to tell me about it? Right. I feel like I can really relate to those kids and maybe just have a little bit more compassion and empathy and just connect to those students as opposed to other teachers. So and also like students that are from like what are those programs called like where students from

	foreign countries come on the exchange program. Yeah, exchange programs. But I feel like I can maybe exchange school stories from those students as well. So I think I can go.

VITA

Nicholas Scott Kim was born and raised in Nashville, Tennessee. After graduating from Martin Luther King Jr. Magnet High School, he attended the University of Tennessee- Knoxville where he earned a Bachelor of Science in Business Administration. After working as an accountant for a year, Nicholas returned to the University of Tennessee to earn his minor in mathematics and secondary education. After achieving the minors, he graduated with a Master of Science in Teacher Education concentrating on Mathematics Education at the University of Tennessee. Nicholas taught high school mathematics for seven years in Knox County Schools in Tennessee. In the summer of 2017, Nicholas decided to pursue a Doctor of Philosophy in Teacher Education. While at the University of Tennessee, Nicholas taught mathematics education courses and supervised science and mathematics education interns. Currently, Nicholas is the project/research coordinator for the Center of Enhancing Education in Mathematics and Sciences (CEEMS) at the University of Tennessee.